Which is More Effective in Educating Teachers to Work with Children with Autism: an Online or Face-to-Face Format of Instruction?

By

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Abstract

The purpose of this study was to evaluate the effectiveness of an online format of instruction versus a face-to-face format of instruction in order to determine which format of instruction is most effective in educating teachers to work with students with autism spectrum disorders. Given the current rise in students with autism being served in public schools, their unique learning needs, and the chronic shortage of special education teachers, there is a need for universities and districts to identify additional ways to be able to effectively train teachers to meet the unique needs of this population of students.

A review of literature revealed that the numbers of children being identified with autism and served in school districts across the country, and Missouri, continues to rise at an alarming rate. Consequently, there is a need for schools to ensure that appropriate educational services are provided for this population (Feinberg & Vacca, 2000; Simpson, 2004). It is well documented that the unique learning characteristics of this population of students differ greatly from other learners requiring teachers to possess specialized skills in order to adequately meet their needs (Simpson, 2005). Identifying additional avenues for training teachers to work with these students is critical.

With the growing number of online education programs, there is an increasing need for scientific studies that evaluate the efficacy of online courses,

both on their own, and as they compare to traditional classroom courses. Research on the satisfaction and achievement of students in online versus face-to-face courses has produced mixed results: some findings suggest that students in online course are not as successful or not as satisfied with their courses as students in face-to-face courses and others suggest that online students perform just as well or better than students in face-to-face classes. There are few studies that look at the relationship and variables between these two formats of instruction for training teachers to effectively work with students with autism spectrum disorders (Weissman, et al., 2004)

Students participating in this study were enrolled in the pilot course as part of a series of 6 graduate courses in the area of autism being offered for the first time at a university in Missouri. State approval for the program was not obtained until shortly after the course began, and enrollment in the courses was limited and expectedly low.

A pre and post survey instrument, the *General Competencies in Autism Spectrum Disorders,* was developed, and completed by both groups of students before the course began, and then immediately following the completion of the course. Students were asked to complete a Likert-scale format of items to rate their own knowledge and skill level in various areas of general knowledge in autism spectrum disorders. In addition, students participating in each format of

instruction completed a survey relative to their particular format of instruction to identify variables they considered beneficial to their particular format of instruction as well as barriers.

The results of this study have important implications for designing the remaining courses in the program, as well as additional personnel preparation initiatives for current and future special educators at the university and in the field of autism. The need for additional, effective teachers to work with students with autism is clear. Is an online format of instruction an effective way to reach more educators? Can individuals who participate in these types of learning formats obtain the necessary skills to be able to transfer what they have learned to work effectively with students with autism?

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Three years ago, I had no idea what the future had in store for me and my children. There were several times when my personal circumstances made it difficult to continue in the program. However, this program has been a major factor in my ability to deal with, and overcome, my personal circumstances. There are no words to adequately express how grateful I am to my KU cohort family who supported me through not only my doctorate, but my life, over the last three years. I have nothing but love and gratitude for all of you. You all know who you are. I have been blessed to have had the opportunity to learn with all of you, and I will always consider you, family.

To my father, my siblings, my boys, my great friends, and my faith; without all of you I could not have made it through the last three years of my life.

Thank you all for inspiring me, supporting me, and encouraging me. I am a better person because of all of you. I welcome and celebrate the end of this phase of my life, and look forward to what is yet to come. For me and my boys, I have faith that life holds much health and happiness as we move onward and upward. We have survived, and we will thrive!

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Chapter One: Introduction

Need for the Study

In 1990, the Individuals with Disabilities Act (IDEA; P.L. 101-476) was signed in to law. This legislation included autism as new category in the definition of students with disabilities. While educational services had been guaranteed to students with autism since 1975, this legislation started a national dialogue regarding educating students with autism that continues today.

Autism affects a significant number of students in schools. Prevalence rates in the United States have risen at a rate of almost 20% per year since data first became available (United States Department of Education [USDOE], 2005). Since 1992, the number of cases of children with autism in Missouri has risen 1563%, and according to Missouri data, there were 5944 cases of students with autism in schools in Missouri during the 2008-2009 academic year. While Missouri lacks an adequate database for information about people with autism in the state, no indicators suggest that rates of incidence are statistically different from national data. (Blue Ribbon Panel Report, 2007). This increased prevalence at the national and state levels has placed considerable pressure on educational systems, creating a strong need for teachers qualified to teach these individuals.

School systems are continuing to be challenged to keep up with theincrease in personnel needed to provide appropriate services for students with

autism. This challenge not only involves the quantity of personnel needed to provide appropriate services to the increasing numbers of students, but it also involves the quality of those personnel who work with these students. Teachers who work with these students must not only be knowledgeable of a range of educational practices, they must also be able to implement them individually based on the needs of the student (National Research Council, 2001: Scheuermann, Webber, Boutat, & Goodwin, 2003; Schwartz, Sandall, McBride, & Boulware, 2004). Simpson stated in 2003 that the preparation of teachers needed to serve these students is the "most significant challenge facing the autism field" (2003, p.194). Teachers who work with students with autism require a foundation of basic educational skills, but they must also combine these skills with specialty skills in the area of autism. Steuernagal (2005) further supported this argument outlining increased teacher training as a priority to be addressed in autism policy, proposing that measures by state and federal governments are grim given the increased prevalence in autism.

Researchers have made recommendations on how best to improve efforts in personnel preparation. The NRC (2001) urged the Office of Special Education Practices to develop and provide funds for preservice teachers and inservice training of current teachers, paraprofessionals, and other professionals serving students with autism. Scheuerman, et al. (2003) provided a discussion on personnel preparation for teachers who serve students with autism. According to

the authors, current personnel preparation measures are inadequate, and unless an intensive effort is made to improve training, teachers will continue to remain inadequately prepared, many students will fail to make progress and some may even regress, schools may face expensive litigation, and families will continue to be faced with the difficult decision as to how to best care for their children. Several recommendations were provided by the authors for improving personnel preparation: prepare more teachers with specialized skills that are needed to address the specific learning needs of students with autism, train teachers in multiple approaches that have been demonstrated to be effective, prepare personnel from various disciplines, provide training for paraprofessionals and parents, as well as technical assistance and support to teachers, and provide leadership and funding to promote personnel preparation.

In recent years, personnel preparation efforts have increased. Policymakers on both the state and national levels have responded to recommendations to provide funding. As part of IDEA (2004), there is legislation to develop and improve programs to train special education teachers to develop expertise in autism (P.L. 108-446, 20 U.S.C. 1462 (b)(2)(G)). Funds in the form of grants have been awarded to personnel, agencies, organizations, and institutions of higher education to provide quality, intensive, professional development. As part of the recommendations of the Blue Ribbon Panel on Autism (2007), the budget that Governor Blunt signed in Missouri for Fiscal Year

2008, included a recommendation of $3.9 million in additional state funding to focus on improvements in the area of autism as it related to treatment and diagnosis. The Blue Ribbon Panel recommends that additional curricula be added to the teacher education programs at the university and college level that is specific to autism spectrum disorders and to the management of behavior problems encountered with autism spectrum disorders.

Increased support and training provided to teachers working with students with autism has occurred in recent years (Muller, 2006). Yet we know very little about the results of those efforts. Not only is more training required, quality training that provides teachers with the skills needed to effectively serve this population (NRC,2001). Training programs must carefully consider content, ensuring a fit with the actual need of participants. Content must be based on evidence-based practices. As training efforts are increased, it is essential to determine information about teachers serving this population so necessary information may be provided to improve teacher knowledge and teacher performance and ultimately, impact student outcomes (Wilson, Floden, & Ferrini-Mundy, 2001).

Online coursework can provide learning opportunities anytime and anywhere with many possible formats to promote user motivation and interests (Collins, Schuster, Ludlow, & Duff, 2002; Smith & Meyen, 2003). Some of the resources can include asynchronous activities, such as video clips of experts,

simulated activities, tutorials, lectures, bulletin boards, and live chat rooms. Oftentimes, online training may include some combination of face-to-face components along with some asynchronous components (Collins, et al., 2002). Collins suggested that in addition to the accessibility factor, another benefit to online coursework is that it can be more cost effective than televised formats.

There is a need to better understand the content and delivery methods for special education personnel preparation programs (Blalock et al, 2003; Kohler & Greene, 2004). This type of research is critical to understanding the effectiveness and impact of teacher preparation programs on teacher knowledge and practices (Wong & Glass, 2005) The results of such a study, even when not positive can provide a necessary understanding of the innovations needed for improvement. Although there have been a significant number of studies that have investigated the effectiveness of online vs. face-to-face formats of instruction, there are few studies that look at this effectiveness in terms of educating teachers to work with students with autism spectrum disorders. As the need for effective educators in the field of autism spectrum disorders continues to rise, parents and school districts continue to search for ways to effectively educate this population in a school setting. This study will look at each of these ways of instruction with relationship to teachers working with students with autism spectrum disorder.

The purpose of this study will be to compare the effectiveness of an online format of instruction provided to a group of students at a university in Missouri

with that of a group of students participating in a face-to-face format of instruction taught by the same instructor, during the same semester, at the same university in Missouri.

This study will analyze the knowledge of autism spectrum disorders as perceived by the students participating in the course formats prior to instruction, and then following their participation in the course as perceived by these students at the end of the semester. The assessments completed by both sets of students throughout the course will be analyzed, and both sets of students will complete a survey to obtain their opinions and perceptions of various aspects of the course content presentation and interaction with the instructor and other students throughout the course. The purpose of this research was to investigate an online format of teacher preparation in the area of autism, and a face-to-face format of instruction to understand the elements that contribute to the successfulness of either format. The following research questions were considered:

1. Are practitioners who participate in an online format of instruction able to gain as much knowledge in the area of autism spectrum disorders as those practitioners who participate in a face-to-face format of instruction?

2. Are practitioners who participate in a face-to-face format of instruction able to gain as much knowledge in the area of autism spectrum

disorders as those practitioners who participate in an online format of instruction?

3. What are practitioner's perceptions of the components of these two formats of instruction that make one format more effective than the other, if any?

4. Which format of instruction was more successful in increasing the level of knowledge and skills in the area of autism spectrum disorders?

5. What additional variables, if any, had an impact on the level of knowledge and skills acquired by either format of instruction, and contributed to the successfulness of the course format?

Limitations

During the field-testing of this first course in the graduate program in autism spectrum disorders, there was one section of the course offered online and one section of the course was offered in a face-to-face format of instruction. Both sections were taught by the same instructor. It was the first semester the courses had been offered. Students in the online course were located in various parts of the state, none within 50 miles of the university's satellite campus where the face-to-face course was offered. Official notification of approval from the state for the autism graduate programs was not received until after courses began. Therefore,

these courses were offered as field test; enrollment was limited and sample sizes were predictably low.

Chapter Two: Literature Review

Autism now affects a significant number of students in schools. The national and state figures may actually under represent the true number of students with autism (Hollenbeck, 2004). While mental health facilities and physicians use the DSM-IV-TR criteria to diagnose autism, school systems must rely upon the federal legislation of the Individuals with Disabilities Act (IDEA) to determine eligibility and services for children diagnosed with or suspected as having autism. When autism was introduced as a federal disability category, states were mandated to provide annual counts of students identified beginning the 1991 school year. Since that time the number of students identified in the United States has increased dramatically (United States Department of Education [USDOE], 2003). Although disagreement exists as to whether the increase in the number of children identified as having symptoms of autism is due to increases in the disorder itself, better diagnostic tests, more inclusive classification guidelines, misdiagnosis, or some combination of these, there is no disputing the fact that autism now affects a significant number of students in the public school system (American Academy of Pediatrics, 2001; Baker, 2002; Newschaffer, Falb, & Gurney, 2005; Steurnagel, 2005). Consequently, there is a need for schools to ensure that appropriate educational services are provided for this population (Feinberg & Vacca, 2000; Simpson, 2004). It is well documented that the unique learning characteristics of this population of students differ greatly from other

learners requiring teachers to possess specialized skills in order to adequately meet their needs (Simpson, 2005). Identifying additional avenues for training teachers to work with these students is critical.

The purpose of this chapter is to summarize the literature regarding relevant aspects of the study. The literature review begins by providing the educational definition of autism, which will be used throughout this research project. This will be followed by a review of literature regarding the current need for trained special educators who can effectively work with this unique population of students. The next section provides an overview of teacher qualifications and the impact of student achievement as described by professional literature. This is followed by a discussion of special education teacher licensure and the educational competencies that were used in the development of the *General Autism Spectrum Disorders Competencies* survey that was used in this project. The literature review concludes with a description of research surrounding the use of online formats to train teachers. This review will provide a rationale for the identification of the research question, the independent variables explored, as well as methodology used to answer the research question.

Autism Defined

Autism is the term commonly used to refer to autism spectrum disorders, a group of neurodevelopmental disorders involving sensory processing problems

and social and language difficulties. (Stuernagel, 2005). It was first described by Leo Kanner in 1943 (Kanner, 1943). Several common characteristics were defined by Kanner that included a lack of social interaction, lack of eye contact, impaired language, repetitive behaviors, and an onset prior to 30 months of age. Autism is now considered to be part of a spectrum of disorders, ranging from severe to milder forms (APA, 1994, Neisworth & Wolfe, 2005, Wing, 1976) and it continues into adulthood (Seltzer, Shattuck, Abbeduto, & Greenburg, 2004).

Currently there are several sources that provide a definition of autism each having a slight differentiation. The International Classification of Disease, tenth edition (ICD-10) provides a definition and set of criterion that is used internationally. In the United States in the medical community, it is the definition contained in *The Diagnostic and Statistical Manual of Mental Disorders,* fourth edition, text revision (DSMIV-TR; APA, 2000) that is most widely accepted (Crimmins, Durand, & Theurer-Kaufman, & Everett, 2002). Autism is referred to as Autistic Disorder in the DSM-IV-TR and falls under the classification of Pervasive Developmental Disorders along with 5 additional disorders that display similar characteristics as those initially seen in children with autism. As outlined in the DSM-IV-TR a diagnosis of autism is made when there are delays or abnormal functioning in social interaction, language as it is used in social communication, or symbolic use and imaginative play, with an onset prior to the age of three. In addition, the following criteria must be met:

1. Qualitative impairment in social interaction, as manifested by at least two of the following:
    a. marked impairment in the use of multiple nonverbal behaviors to regulate social interaction
    b. failure to develop peer relationships appropriate to developmental level
    c. lack of spontaneous seeking to share enjoyment, interests, or achievements with other people
    d. lack of social or emotional reciprocity
2. Qualitative impairments in communication as manifested by at least one of the following:
    a. delay, or total lack of, the development of spoken language
    b. in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
    c. stereotyped and repetitive use of language or idiosyncratic language
    d. lack of varied, spontaneous make-believe play or social imitative play appropriate to development level
3. Restricted repetitive and stereotyped patterns of behavior and activities as manifested by at least one of the following:

a. encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
b. apparently inflexible adherence to specific, nonfunctional routines or rituals
c. stereotyped and repetitive motor mannerisms
d. persistent preoccupations with parts of objects

While mental health facilities and physicians use the DSM-IV-TR criteria to diagnose autism, school systems must rely upon the federal legislation of the Individuals with Disabilities Act (IDEA) to determine eligibility and services for children diagnosed with or suspected as having autism. The IDEA legislation, as of the 1990 Amendments (P.L. 101-476), specifies autism as one of the 13 recognized classifications making it a nationally recognized educational category of disability. The Individuals with Disabilities Education Act defines autism as:

> a developmental disability significantly affecting verbal and nonverbal communication and social interaction, usually evident before age three, that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences (34 C.F.R.300.7(c)(1)).

States must adopt eligibility criteria in accordance with the criteria found in IDEA. In keeping with the federal guidelines, Missouri uses as a basis for legal requirements that which is found in the *Missouri State Plan for Special Education,* Section III Fed. Regulations 300.8, 300.306. According to this definition, a student with autism must meet two requirements before being declared eligible for special education services under IDEA. As outlined in the state regulations the student must have documentation of disturbance of the communication process and a disturbance in the capacity to relate appropriately, and these disturbances must have an adverse affect on educational performance. These criteria ensure that there is an educational need, and not a label that drives the provision of services (Volkmar, Rhea, Klin, & Cohen, 2005).

When autism was introduced as a federal disability category, states were mandated to provide annual counts of students so identified beginning the 1991 school year. Since that time the number of students identified in the United States has increased dramatically (United States Department of Education [USDOE], 2003). Fighting Autism is a site that provides information on research, education, and treatment issues related to autism (http://www.fightingautism.org). Table 2.1 illustrates the number of students with autism ages 6-22 served under IDEA in the United States since data first became available, and includes the data beginning in 2000 after children 3-5 with autism began being served as well based on data obtained on Fighting Autism. The growth of students with autism in Missouri is

illustrated in this table as well (MODESE, 2010). The other significant aspect of this table is the illustration of annual growth in all other areas of disability. Graphs of this information are in Appendix A.

Cases of Autism & Cumulative Growth

	United States	Missouri
Cases of autism in schools 1992 ages 6 - 22	15,580	336
Cases of autism in schools 2008 ages 6 - 22	292,818	5589
Cases of autism in schools 2000 ages 3 - 22	93,650	1723
Cases of autism in schools 2008 ages 3 - 22	337,795	5944
Cumulative Growth in # of Cases from 1993 to 2008	1779%	1563%
Annual Growth Range in autism cases 1993-2008	28% - 13%	26% - 13%
Annual Growth Range in all other disabilities 1993 - 2008	3% - 2%	4% - -4%

Table 2.1

The national and state figures may actually under represent the true number of students with autism (Hollenbeck, 2004). Those students who have not yet come to the attention of professionals are not accounted for. The data do not take into account those students who have autism, but are classified under a different disability category (Hollenbeck, 2004). One study conducted in New Jersey reported only 66% of students who met the DSM-IV criteria for autism and received special education services, were identified under the autism disability category (Bertrand, Mars, Boyle, Yeargin-Allsopp, & Decoufle, 2001). An additional study in Georgia reported only 41% were recorded with an autism

designation. The remaining students were identified under other eligibility categories including developmental delay, intellectual disability, or speech and language impairment. (Yeargin-Allsopp, Rice, & Karapurkar, 2003).

There is debate among professionals regarding why the prevalence of autism has increased so dramatically (Steuernagel, 2005). According to the National Institute of Mental Health, the exact prevalence of autism is unknown. Estimates range from 1 person in 500 to 1 in 1000 in this country; and the number is growing (Steurenagel, 2005). Some estimates indicate that 1 in 150 children being born in this country is a child with an autism spectrum disorder, and 1 in 94 boys will be affected by autism (NIH, 2008). While many feel there is a definite increase in the occurrence of autism, it is difficult to determine if there truly has been such dramatic increases in the occurrence of the disorder itself, or if past rates were underestimated. The rise in autism is likely attributed to a variety of factors. These include changes in the diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders expanding the definition of autism to a spectrum of disorders (APA, 1994); availability of better diagnostic instruments and medical resources; and a heightened public awareness, due in large part to efforts of parent and advocacy groups and increased media coverage (Fombonne, 1999; Gernsbacher, Dawson, & Goldsmith, 2005). Although disagreement exists as to whether the increase in the number of children identified as having symptoms of autism is due to increases in the disorder itself, better diagnostic

tests, more inclusive classification guidelines, misdiagnosis, or some combination of these there is no disputing the fact that autism now affects a significant number of students in the public school system (American Academy of Pediatrics, 2001; Baker, 2002; Newschaffer, et al., 2005; Steurnagel, 2005). Consequently, there is a need for schools to ensure that appropriate educational services are provided for this population (Feinberg & Vacca, 2000; Simpson, 2004).

Learning Needs of Students with Autism

Research has demonstrated students with autism present unique learning needs requiring specific instructional strategies and skills (Heflin & Simpson, 1998; Jones, 2006; NRC, 2001). Individuals diagnosed with autism present with a mixture of cognitive, social, language, sensory, and behavior deficits (NRC, 2001). Autism impacts many aspects of thinking and learning. Cognitive ability is interwoven with social and communication difficulties, while the presence of problem behavior and sensory processing difficulties may interfere with learning. (Anzalone & Williamson, 2000). While all individuals with autism share common characteristics, each individual is unique. This results in unique learning characteristics that differ widely from typical learners with other disabilities (Jones, 2006; Neisworth & Wolfe, 2005: Simpson, 2005).

The learning characteristics of individuals with autism provide a complex set of issues for educators. Adding to the complexity is the presence of a wide array of abilities and difficulties. As noted by Simpson:

> The countless permutations and combination of social interactions, language, learning, sensory, and behavior deficits and excesses found in these individuals, in combination with their wide range of abilities, developmental levels, isolated skills, and unique personalities make autism an especially baffling disability. (Simpson, 2001, p. 69).

Although all students with autism share common characteristics, each individual is unique. Due to the multidimensional nature of the disorder, it is especially critical that educators take into account the specific qualities of the individual. This includes not only his or her learning characteristics. Equally important are the strengths, interests, developmental needs, and personality that define the student as an individual (Feinberg & Vacca, 2000).

The State of Educational Services for Students with Autism.

The goals of education for individuals with autism are the same as the goals for any other student. Educational services should provide opportunities to acquire skills that increase personal independence and social responsibility (Kavale, Forness, & Siperstein, 1999). This involves curriculum and instructional activities to prepare the student for employment, postsecondary education, community living and participation, and social inclusion (Nolet & McLaughlin, 2005). This is consistent with IDEA (2004) which states, "Improving educational

results for children with disabilities is an essential element of our national policy of ensuring equality of opportunity, full participation, independent living, and economic self-sufficiency for individuals with disabilities" (IDEA 2004, Part A U.S.C. 601 (c)).

A review of literature suggests this provision is not provided equally to students with autism. Academic achievement is low in comparison to typically developing students, as well as students from other disability categories (Wagner, et al. 2003; Wagner, et al. 2006). Although those students with autism educated in the general education classroom are reported by teachers as having high grades and keeping up with academics, on average, they are over four years behind grade level in reading and nearly five years behind in mathematics (Wagner, et al., 2003). Wagner et al., (2006) looked at academic achievement in language arts, mathematics, science and social studies using subsets of the Woodcock-Johnson III, and found average assessment scores for adolescents with autism were three standard deviations below the mean. For students not capable of taking an academic assessment, functional skills were measured. Only 16% achieved a score equal to or above the mean and 65% scored more than six standard deviations below the mean. This indicates that most students found age-appropriate functional skills extremely difficult or impossible to perform.

Free Appropriate Public Education.

The foundation of IDEA is the provision of a free appropriate public education (FAPE) to all children with disabilities who meet the eligibility requirements of the law (IDEA, 20, U.S.C. 1401(8)). A FAPE consists of publicly funded educational services that are individually designed to meet the needs of the student. The federal legislation does not provide a substantive definition of appropriate. Instead, leaves it open for interpretation, because what constitutes an appropriate education will vary from student to student (Yell & Drasgow, 2000). This lack of a precise definition has put pressure on state and local school districts to define an appropriate education and ensure the implementation of such services (Feinberg & Vacca, 2000).

For students with autism, this has been a particular challenge and a difficult public issue. (Feinberg & Vacca, 2000). In the last two decades, a large number of approaches have been demonstrated to be effective with individuals with autism (Anderson & Romanczyk, 1999; Bondy & Frost, 2002; Gray, 1998; Iovannone, Dunlap, Huber, & Kincaid, 2003; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993; Rosenwasser & Axelrod, 2001; Schuermann, et. al., 2003; Simpson, 2005). There is little consensus as to the etiology of or best treatments for autism. There is ongoing concern regarding the educational services and delivery of a free and appropriate public education for children with autism.

Policymakers seeking to construct policies on the education of children with autism will not find a widely accepted set of best practice standards (Steuernagal, 2005). Even though there is strong evidence that early intervention allows children with autism to develop better functional skills, the evidence to date suggests that there is not a single form of early intervention that will benefit all affected children. There is a lack of guidance for determining which practices are empirically validated and which are appropriate for individual students (Olley, 1999). The literature is a "mix of science, anecdotal reports, and unproven theories" (Olley, 1999, p.595). Contributing to the problem is the plethora of information available in the public media, such as magazine articles, television, and the internet. Various stakeholders maintain different positions regarding criteria they value. Researchers view strategies supported through rigorous analysis as critical, while parents generally are more interested in personal testimonies and case studies. This has led to much controversy among researchers, educators, and parents regarding what constitutes an appropriate education for students with autism (Yell & Drasgow, 2000).

What constitutes FAPE has been heavily debated in the courts since the passage of IDEA (Yell & Drasgow, 2000). In the *Board of Education v. Rowley* (1982), the first special education case heard by the Supreme Court, standards for determining FAPE were set. In this decision, commonly known as the Rowley

decision, the Supreme Court held that students with disabilities are entitled to an individualized educational program with services reasonably calculated to confer educational benefits (Rowley, 1982, pp.206-207). Since that time, other cases have expanded the meaning of FAPE. In *Board of Education v. Diamond* (1986) and *Polk v. Central Susquehanna Intermediate Unit 16* (1988), courts ruled FAPE must result in "meaningful" educational benefit, and trivial progress was insufficient. In the more recent case, *K.L. v. Mercer Island School District* (2006), the definition was further expanded to include the requirement for educational services aimed at achieving independence and self-sufficiency.

Litigation debating FAPE for students with autism has become the focus of numerous due process hearings and court cases (Yell, Katsiyannis, Drasgow, & Herbst, 2003; Zirkel, 2002). According to Baird (2001), this is the fastest growing area of litigation in special education. Zirkel (2002) prepared a comprehensive review of case law concerning students with autism transpiring between 1978 and 2000. During this time, 290 cases were reviewed, resulting in 450 issue rulings and 383 relief rulings. Various forms of relief included compensatory education, monetary damages, declaratory or injunctive relief, or tuition reimbursement.

These decisions hold important implications for school districts serving students with autism. According to Yell and Drasgow (2000) school districts

must ensure adherence to procedural and substantive requirements of FAPE. In doing so, they must ensure: students are placed in integrated settings to the maximum extent possible; IEPs are developed addressing all areas of need identified in the evaluation and are calculated to provide educational benefit; empirically validated instructional strategies and programs are adopted and applied in classroom practice; teachers collect meaningful data to document student progress toward goals on the IEP; and professionals working with students with autism have knowledge and expertise in this area.

Teacher Qualities and Skills

The current shortage of fully certified special education teachers, which has been described as severe, chronic, and pervasive, threatens the quality of educational services that students with disabilities receive (Billingsley & McLesky, 2004). Special education teacher shortages have resulted in the need for State Education Agencies (SEA) to implement a variety of initiatives related to teacher licensure (Feistritzer, Haar, Hobar, and Losselyong, 2004; Katsiyannis, Zhang, & Conroy, 2003). Alternative routes to certification (ARC) have become commonplace in most states (Geiger, Crutchfield, & Mainzer, 2003; Katsiyannis, et al., 2003). In addition to states increasing ARC, many states have made a shift towards noncategorical licensure (Geiger, et al., 2003; Katsiyannis, et al., 2003).

In 2002, 27 states offered a noncategorical special education licensure (Geiger, et al., 2003). The impact of noncategorical licensure is yet to be determined, although there has been much speculation on the subject.

The relationship between teacher qualifications and student achievement is well-documented (Begle, 1979; Darling-Hammond, 1999; USDOE, 2002). Darling-Hammond (1999), after analyzing data from a 50-state survey of policies, state case study analysis, the 1993-1994 Schools and Staffing Surveys (SASS), and the National Assessment of Educational Progress (NAEP), found teacher quality contributes more to student achievement than student background, class size, overall spending levels, or teacher salary. Teachers who are not adequately trained may have a detrimental effect on student learning. Sanders and Rivers (1996) found groups of students with comparable abilities in achievement levels had vastly different outcomes as a result of the teachers to whom they were assigned.

The primary impetus behind the passage of NCLB (2001) and later IDEA (2004) was a desire to improve student achievement and ensure equal educational opportunity for all students. The plan embedded in NCLB (2001) and IDEA (2004) recognized the relationship between teacher quality and student achievement, and as a result, set the important goal for all students to be taught by a "highly qualified teacher" (HQT). To meet the highly qualified standards, one

must: (a) hold a minimum of a bachelor's degree, (b) obtain full state certification or licensure, and (c) demonstrate competence in each academic subject matter taught (NCLB, 2001). The HQT standards are the same for special education teachers as they are of general education teachers. However, the requirement of demonstrating subject matter competency is more complicated due to the wide array of possible teaching assignments (Yell, 2006). Special education teachers who teach an academic subject must demonstrate competence in the subject matter taught. For those who teach students assessed using alternative achievement standards, subject matter competency is based on the level of instruction needed to provide effective instruction. In Missouri, all teachers including special education teachers who teach core academic subjects in grades 7 and up need to demonstrate core content knowledge in every subject they are teaching. Special Education teachers who teach core academic subjects exclusively to MAP-A students, regardless of grade level, need an Elementary Education 1-6 certificate or pass the Praxis II in Elementary Education: Curriculum, Instruction and Assessment (MODESE, 2010).

In 2003, in a study conducted by the Center on Personnel Studies in Special Education (COPSSE), Brownell, Ross, Colon, and McCallum (2003) analyzed special education teacher preparation programs. They concluded that special education teachers require instruction in both subject matter knowledge as well as instructional pedagogy. NCLB recognized significant achievement gaps

for students with disabilities (USDOE, 2002). Despite legislation mandating teacher qualifications, there is little research specifically evaluating special education teacher qualities that lead to improved student achievement. This situation is problematic given the critical need for special education teachers (Carlson, Schroll, & Klein, 2002) and the existing achievement gap (NCLB, 2001).

The actual qualities special education teachers must possess vary from state to state. State licensure standards significantly impact teacher qualities by outlining specific requirements (Porter, 2000). Brownell, Ross, Colon, & McCallum (2003) analyzed special education teacher preparation programs and identified common components believed to be critical to teacher preparation in an effort to address qualities required of special education teachers. They included: a blending of a positivist and constructivist orientation to learning which provided students with research-validated practices and a variety of pedagogical techniques; training in collaboration with professionals and families; guidance on inclusion and cultural diversity; and ability to integrate learned knowledge and skills. Ryncak, Clark, Conroy, and Stuart (2001) obtained information from fifty-one institutions of higher education, believed to have exemplary teacher preparation programs in severe disabilities. Several common qualities needed to teach students with severe disabilities were identified. Among them were:

effective collaboration and consultation skills; knowledge of inclusion practices and strategies; skills in facilitating transitions across age and settings; knowledge of issues related to individual and family advocacy; knowledge of strategies to address communication, physical, and sensory needs; ability to develop and incorporate an appropriate curriculum; knowledge of effective instructional techniques and strategies; ability to conduct functional assessments and develop behavior intervention plans; and ability to interpret research in the area of severe disabilities.

Special education teacher shortages have resulted in the need for State Education Agencies (SEA) to implement a variety of initiatives related to teacher licensure (Feistritzer, Haar, Hobar, and Lossellyong, 2004; Katsiyannis, Zhang, & Conroy, 2003). Alternative routes to certification (ARC) have become commonplace in most states (Geiger, Crutchfield, & Mainzer, 2003; Katsiyannis, et al., 2003). With ARC, teachers are typically hired with little or no formal teacher education; with the understanding that licensure requirements will be completed in three years (Darling-Hammond, 1999). In 2002, 45 states and the District of Columbia had some type of alternative teacher licensure program (Geiger, et al., 2003).

Nourgaret, Scruggs, and Mastropieri (2005) examined the relationship of licensure status to performance of special education teachers. Results indicated

that teachers with full licensure outperformed those with provisional licensure on observational ratings of planning, preparation, classroom environment, and instruction. In the Study of Personnel Needs in Special Education (SPeNSE; Carlson, et al., 2002), the relationship between licensure status of special education teachers and perceived teacher preparation was explored. Findings reported special education teachers who rated their preservice preparation as very good or exceptional considered themselves more successful than others in providing services to students with disabilities.

In addition to states increasing ARC, many states have made a shift towards noncategorical licensure (Geiger, et al., 2003; Katsiyannis, et al., 2003). In 2002, 27 states offered a noncategorical special education licensure (Geiger, et al., 2003). Missouri is one of those states. Noncategorical licensure provides additional means to increase the general availability of special education teachers. By permitting teachers to instruct students from different disability categories, administrators are given more flexibility to make classroom assignments (Geiger, et al., 2003; Muller, 2005).

The impact of noncategorical licensure is yet to be determined, although there has been much speculation on the subject. The Council for Exceptional Children (CEC) presented a report delineating the pros and cons for noncategorical licensure in special education (2004). It was noted that most

special educators work in settings with students with a variety of disabilities. Therefore, a primary advantage is allowing teachers to focus on the instructional strategies each child needs rather than on his or her disability. However, some disadvantages were also noted. Specifically, noncategorical licensure may prevent students with disabilities from receiving appropriate educational instruction. Teachers may only have a foundational knowledge of particular disabilities, and may not have the depth of knowledge and skills needed to work with some students. Eichenger and Downing (2000) add to this argument, stating that some special education teachers need specialized knowledge and skills to teach students with complex needs.

Specific requirements of special education teachers who serve students with autism are sparse. In 2005 there were only five states throughout the country offering licensure in the area of autism (Muller, 2005). A recent search indicates that only one more state has added a licensure in the area of autism (OSEP, 2009). In Missouri, there is no licensure in autism. Currently, Missouri has licensure in the areas of early childhood special education (Birth to Grade 3, blind/partially sighted (B-12), deaf/hearing impaired (B-12), mild/moderately disabled (K-12), and severely developmentally disabled (B-12) (MODESE, 2010). The previous separate state categorical certifications were discontinued in Missouri in 2005.

Educational standards have long been used to outline necessary teacher qualities (Blanton, 1992). These standards delineate the knowledge, dispositions, and performances deemed essential for teachers, allowing the individual to practice ethically, safely and effectively (CEC, 2004). Institutions of higher education utilize educational standards to guide and develop teacher preparation programs that will produce quality teachers (Blanton, 1992). There are a variety of agencies and organizations that have outlined educational standards. For example, the National Council for Accreditation of Teacher Education (NCATE) has developed standards for teacher preparation programs (NCATE, 2007), while the National Board for Professional Teaching Standards (NBPTS) provides standards for advanced teacher certification (NBPTS, 2006).

The Council for Exceptional Children (CEC) provides a comprehensive list of standards for special education teachers. The CEC began developing teaching standards in the early 1990s, and in 2004 released its latest edition of the CEC Standards defining the standards of a well prepared special education teacher (CEC, 2004). This document consists of 10 content standards: foundations, development and characteristics of learners, individual learning differences, instructional strategies, learning environments and social interactions, communication, instructional planning, assessment, professional and ethical practices, and collaboration. Each content standard is comprised of knowledge

and skill competencies that reflect a well-prepared special educator (CEC, 2004). The content standards apply to all special education teachers, regardless of specialty area. The CEC further outlines knowledge and skills needed in teaching specialties by providing a distinct set of standards for different teaching categories.

The standards developed by the CEC have impacted special education state licensing practices and teacher preparation programs. Currently, over 40 states, including Missouri, align their state licensing process with the CEC standards (CEC, 2004). According to the CEC, alignment with these standards ensures that teacher preparation programs provide special educators with the skills they need to practice effectively (CEC, 2004).

Although there is a significant research base on effective teaching practices for students with autism, there has been surprisingly little effort to define the specific knowledge base teachers must have to serve this group of students effectively (NRC, 2001). There were no nationally accepted professional standards for teaching students with autism available until the fall of 2009. The CEC provided educational standards for teachers in eight other categorical areas of special education, but did not provide standards in the area of autism (CEC, 2004). Several states have developed guidelines for educating students with autism. Currently, Missouri does not have specific educational guidelines for

educating students with autism. As a result of most states not having specific licensure in autism these students are educated by teachers with a variety of types of licensure. As the prevalence of autism continues to rise, it is probable that special educators will provide services to a student with autism during their career, regardless of their primary certification content area (McLeskey, Tyler, & Flippin, 2003). McLeskey et al. (2003) found that the majority of special educators taught students from different disability categories with 80% having taught students from two or more categories and 32% from four or more categories. Autism is significantly associated with mental retardation, with approximately 30% scoring in the mild-to-moderate range and 40% scoring in the serious-to-profound mental retardation range (Fombonne, 2003). Furthermore, an association with some medical conditions is often present, including tuberous sclerosis, fragile X, cerebral palsy, Down syndrome, and epilepsy (Fombonne, 2003). Given these statistics, it is likely that a teacher serving students under the primary content areas of mental retardation or severe and profound disabilities will work with children with autism at some time throughout their teaching career.

Carlson et al. (SPeNSE, 2001), surveyed special education teachers from different teaching assignments to determine types of disabilities served by each provider. Six percent of special education teachers whose primary teaching

assignment was vision or hearing impairment taught at least one student with autism. Thirteen percent of teachers who primarily taught students with learning disabilities and eighteen percent who primarily taught students with emotional disturbance had at worked with at least one student with this handicapping condition. Special educators whose primary assignment was teaching students ages 3-5 were the most likely to serve a student with autism, with 38% having at least one student on their case load. Teachers serving students with mental retardation or severe disabilities were not surveyed in the SPeNSE study, so it is unknown what percentage of teachers serving theses students may also serve those students with autism.

The chronic teacher shortage in special education impacts the availability and quality of teachers who serve students with autism (NRC, 2001). Data from the past two decades demonstrate a shortage in special education that is likely to continue (Carlson, et al., 2002; McLeskey, et al., 2003). More than 12,000 positions in special education were unfilled and 29% of special education teachers were not certified in 1999-2000 (Carlson et al., 2002). Of the nation's school districts, 98% reported special education teacher shortages in the 2001-2002 school year (McCleskey et al., 2003). According to the state of Missouri data from the 2007-2008 school year, of the 497 districts reporting teacher shortages,

189 of the 540 vacancies, or 35%, were special education related positions (MODESE, 2009).

According to the NRC (2001), the teacher shortage is exacerbated in the growing field of autism. One study conducted by the Virginia Department of Education, surveyed public school administrators regarding their ability to locate qualified professionals to work with children with autism spectrum disorders (Dymond & Myran, 2002). Only 30% of administrators reported having no problems locating personnel, while 38% reported difficulty doing so. Additionally, 57% indicated having more difficulty finding qualified special education teachers for students with autism than students with other types of disabilities.

Recently, a number of studies have evaluated the knowledge, practices, and training needs of professionals who work with individuals with autism. Cascella and Colella (2004) investigated the knowledge of autism spectrum disorders among speech-language pathologists. Eighty-two speech-language pathologists working in schools in Connecticut were surveyed. Knowledge was assessed by asking questions about behavioral characteristics, communication characteristics, related education and intervention strategies, assessment formats, and inclusion strategies. Participants reported the most knowledge in behavioral

and communication characteristics associated with autism spectrum disorders, and the least knowledge in education and intervention strategies.

Stahmer, Collings, and Palinkas (2005) examined the knowledge and practices of early intervention service providers. Twenty-two early intervention specialists who worked with children with autism under the age of five participated in focus groups. Providers reported using mostly non-evidence based techniques. Of the 30 interventions listed, only one third were evidence based. Participants reported wanting to use only those methods shown to be effective, but few had analyzed the literature on the techniques used. All providers reported concerns about adequate training and desired further information on interventions that are effective with children with autism.

Despite research exploring knowledge, practices, and training needs of professionals, few studies have been conducted with special education teachers or teachers currently serving students with autism. This provides a tremendous gap in the literature that needs to be addressed. Information on teachers who currently serve students with autism can provide valuable information regarding areas of strength and need. This information can be utilized to improve teacher training efforts, resulting in teachers who are well-equipped to serve this population.

Whaley (2002) completed a dissertation surveying special education teachers who work with students with autism in Tennessee. The knowledge of

etiology and educational programming, the types of teaching methodologies implemented, and the training needs of teachers were evaluated. A total of 292 special education teachers working in 11 school districts in Tennessee completed surveys. Experience with students with autism ranged from one year to twenty one years, with most participants indicating 1-5 years of experience.

On the knowledge portion of the survey, special educators were asked true/false questions about etiology and educational programming. In etiology, teachers had a mean score of 73% correct. In educational programming, teachers received a mean score of 79%. Items missed on the survey varied between participants. However, there were similar misconceptions. Teachers inappropriately viewed autism as an emotional disorder, despite evidence that it is neurobiological in nature. Additionally, teachers believed facilitated communication was validated through research.

When assessing teaching methodologies implemented, participants were provided a list of teaching methodologies substantiated by research, and asked to indicate methodologies used. Of the strategies provided, the following percentages were obtained: 50% structured teaching, 39% Picture Exchange Communication System, 22% augmentative communication devices, 20% applied behavior analysis, 20% discrete trial training, 19% incidental teaching, and 18% functional communication training. These data indicated most teachers were not

utilizing research based practices. Structured teaching, the methodology most commonly reported, was utilized by only half of participating teachers. More alarming, was the extreme infrequency with which other valuable teaching strategies were utilized. Assessment of training needs of special education teachers indicated most (77%) wanted further training in strategies to support students with autism. Teachers were provided with a checklist of training areas and asked to rate specific needs. Applied behavior analysis was the area most commonly indicated, with 48% reporting a desire for training in this area. Strategies for teaching self-help skills was second, with 36%, and strategies for teaching academic skills was third, with 35%. Results of this study indicated special education teachers lack an understanding of the research base regarding autism. Teachers overwhelmingly were not utilizing research based practices with students with autism. Most teachers desired more training in this area.

Jennings (2007) completed a dissertation study which sought to gain information about educational programs used in Virginia to serve students with autism. Jennings surveyed directors of special education. Of the 139 special education directors, 93 responded. His findings indicated that just under half of school districts reported the use of traditional educational services (41.9%), whereas remaining school districts used specially designed programming to serve students with autism. Of the school districts using specialized programming,

31.2% reported employment of a combination of strategies, while 27% reported a single instructional method (applied behavior analysis, floortime, or structured teaching). A variety of factors were identified as impacting the type of programming used to serve these students. The needs of students as outlined in the IEP was the most common (31.2%), followed by accommodating faculty and staff training requirements (25.8%), available resources (19.4%), and research on autism (12.9%). When asked to compare the perceived effectiveness of the programming employed, mean scores from school districts using a combination of specially designed programs were significantly higher than those from districts using traditional programming or any of the single instructional methods. These data indicate school districts using a combination of strategies specifically designed for students with autism perceived them to be more effective as compared to school districts relying on traditional programming or a single instructional methodology.

Most directors who participated in the study agreed or strongly agreed that their school district effectively served students with autism (89.3%) and believed their personnel were effectively trained (72%). Despite these positive views, the majority agreed or strongly agreed an endorsement in autism was needed in Virginia to improve educational services for these students (72.1%).

Additionally, the majority reported a desire to change the current autism program in their district and a need to improve services (61.2%).

The critical issues encompassing needed content, knowledge and skills for teachers educating students with autism, necessitates new forms of personnel preparation delivery, and online distance learning technology is potentially one such innovative approach (Blalock, Kochhar-Bryant, Test, Kohler, White, Lehmann, et al., 2003). The need for qualified special education teachers is motivating higher education to use distance education and online technologies (Smith & Meyen, 2003). Online technology is the vehicle that can provide critical content to significant numbers of educators and service providers in their home or work setting offering the flexibility of any-time learning (Morningstar & Clark, 2003). The use of online technology is rapidly becoming widespread in delivering special education coursework because it provides the opportunity to reach a large number of students covering a broad geographic area (Collins, Schuster, Ludlow, & Duff, 2002; Smith, Smith, & Boone, 2000). Collins et al., (2002) reported that online technology has made a great impact on distance education programs in a short period of time. Models in which the instructor traveled to locations to offer face-to-face coursework is changing to a model where instructors use technology to deliver coursework to distant sites because of the increased availability, low costs, and flexibility in delivery and access.

The flexibility and accessibility that online coursework offers allows the freedom for students to participate when and where they want as well as the availability of a variety of presentation formats that meet the needs of diverse learning styles (Smith & Meyen, 2003; Morningstar & Clark, 2003). According to Smith & Meyen (2003), technology provides endless options and thus opportunities to support or accommodate learning. In the field of higher education, colleges and universities are rapidly increasing online courses offered to meet the needs of students. Convenience is one primary motivating factor for taking online courses, especially for students who would find it difficult to commute from their place of employment (Leonard & Guha, 2001). Educational institutions benefit by increasing their enrollment rate, thus providing online courses can be seen as an important benefit for college educators (Leonard & Guha, 2001; Smith, Smith, & Boone, 2000). Some universities have begun to offer entire undergraduate and graduate programs online.

The trend towards increasing online courses offered by higher education institutions appears to be in full swing; thus, there is a need to evaluate the effectiveness of the online courses as well as the contribution and impact of the course components on learning. Smith, Smith, and Boone (2000) conducted a study to determine if traditional modes of instruction can be used effectively in an online learning format for preservice teacher education students. The online

course evaluated in this study was an educational technology integration course that focused on accommodation issues and strategies to promote the inclusion of all students in the general curriculum classroom. These authors reported that online learning was as effective as face-to-face instruction in the three modes they measured that included lecture, guided instruction, and collaborative instruction. Furthermore, these authors reported that student's participation in discussion increased in the online course format as compared to the face-to-face course. They suggested that contributing factors for increased students participations in discussion could be increased opportunity, more time to consider and formulate a response, and that dominating personalities are neutralized in the online discussion format (Smith, Smith, & Boone, 2000). Another reported result is that the student's academic performance was equal in both instructional formats. The implications of this study, according to the authors, is that traditional instructional methods translate effectively to online learning without altering instructional technique or curriculum content.

Caywood and Duckett (2003) conducted a quantitative study directly comparing a pre-service teacher special education course on behavior management that was offered on-campus and online to determine if there was a significant difference between the two formats in learning as measured by multiple quizzes. The authors reported that there were no significant differences

in the quantitative measures of learning between the groups. In addition, they indicated that in follow-up observation reports, supervisors rated these student teachers high on behavior management skills suggesting that the knowledge gained in the course influenced their practice.

In another study, researchers investigated perceptions of preservice teachers who were participating in online discussion as a required supplement to the traditional face-to-face course they were taking (Killian & Willhite, 2003). Killian and Willhite conducted a pre and post online discussion survey and found that student post survey ratings were more positive than the prediscussion ratings (Killian & Willhite, 2003). In other words, students reported that their participation in the online discussions were more positive than they initially thought they would be (Killian & Willhite, 2003). Similar to the findings reported by Smith and colleagues (2000), these authors reported an increase in student participation in the online discussion, and students reported that they experienced an increased sense of community building with their peers. Additionally, the instructor reported an increase in the rate of reflective thinking and substantiated comments with the online discussion as compared to the discussion that took place in the classroom. There appears to be an increasing body of evidence that online education could impact special education teacher preparation. Smith and colleagues (2000) reported that online courses have

quickly become an alternate mode for institutes of higher education to offer special education courses.

A nation-wide shortage of qualified teachers to serve children and youth with disabilities has been identified as reaching a critical level (NCSET, 2004). Even if this monumental problem were to be resolved, it appears the lack of qualified special education teachers with knowledge and competencies in autism would still exist. To date, literature regarding special education teachers who serve students with autism is limited. The rise in reported numbers of students with autism in public schools, poor educational outcomes, increased litigation, and an expansion of knowledge of educational practices that are effective with the population, has led to a sense of urgency among educators and parents to ensure students are provided an appropriate education. Additionally, increasing legislative demands placing an emphasis on teacher qualities raise questions about special education teachers who serve students with autism.

Existing data provide some information about the perceived state of educational services for students with autism. Research designed to identify specific knowledge and practices of teachers who work with this population will yield valuable information that can guide training initiatives. Such research will provide compulsory information needed to improve teacher performance, and ultimately impact student outcomes (Wilson, Floden, & Ferrini-Mundy, 2001).

Additional effective ways of educating current teachers in the field of autism as well as preservice teachers must be identified in order to meet the increased educational needs of this growing population.

Online learning has the potential to reform teacher preparation, and more specifically, may be the vehicle for improving teachers' knowledge and competencies in the area of autism spectrum disorders. The benefits of online education include cost effectiveness, accessibility, flexibility, and an array of technology that can meet the needs of diverse learners. According to some, what is more important than accessibility and flexibility is the potential quality of online instruction that makes this option exceptional (Smith & Meyen, 2003). Another benefit is the opportunity to create a collaborative network of colleagues and peers from diverse locations (Killian & Whillhite, 2003).

Literature is available that addresses the effectiveness of an online format of instruction versus a face-to-face format. However, there is paucity in the literature as it relates to a comparison of these methods relative to their effectiveness for educating individuals to work with students with an autism spectrum disorder. Weissman, Sulzer-Azaroff, Fleming, Hamad and Crockett (2004) presented survey results from a four-course internet curriculum that provided training in behavioral intervention in autism, along with pre-and post-test data that suggest students in both course format types successfully learned the

material and were quite satisfied with both the content of their course and their instructor. This study will evaluate special education teachers' knowledge of educational practices critical for the improvement of students with autism, and their acquisition of new knowledge and skills provided through an online format of training or a face-to-face setting. The study will use information gathered from special education teachers enrolled in the first of a series of graduate courses that focus on autism spectrum disorders at Missouri Western State University. A survey instrument, the *General Autism Spectrum Disorders Competencies,* will be utilized during this project. The survey uses a self-evaluation process to obtain the teacher's current level of knowledge as compiled from basic knowledge competency requirements currently used in several states, and directly related to the objectives of the course. Students completed the survey at the beginning of the course, and then immediately following the completion of the course. The survey was completed by both the online course participants and those in the face-to-face course. Students in both courses also completed online assessments relative to the material presented in the course following the presentation of the materials. All students were expected to participate in discussion threads involving students in the course as well as the instructor. To participate in the threaded discussions, students logged on to the course site at their convenience at some point during the week when a particular topic was addressed, read comments by the instructor, other students, or guests and posted their own

comments relative to their personal experiences or assigned readings. The students in the face-to-face course participated in the same discussion threads in the same manner as the students in the online section of the course. All students participating in both courses were asked to complete a survey related to their course experience and level of knowledge and skill acquisition acquired through the particular format of instruction in which they participated. Additional information obtained focused on previous knowledge level and possible reasons for their format of instruction choice. Which format of instruction was the most effective? Is an online method of instruction a viable option as universities and school administrators seek to address the increased need for qualified special educators to work with their population of students with autism? The results of this study may have important implications for designing personnel preparation initiatives for current and future educators working with students with autism spectrum disorders as this issue continues to be a focus nationally, and in Missouri.

Chapter Three: Research Methodology

Purpose of the Study

Because of the critical shortage of special education teachers who are qualified to provide appropriate services to students with autism, it is important to investigate alternate formats of teacher preparation programs that an online format of instruction provides. More specifically, there is a need to understand students' perceptions of the components of online coursework versus face-to-face coursework that might improve learning and impact practice. The following chapter details the purpose of the study, research design employed, and rationale for the research design. A description of the population, description of the survey instruments, the assessments, and the procedures are provided. This descriptive research utilized pre and post surveys completed by students participating in both formats of instruction, topic assessments and a cumulative final exam completed online by students in both formats of instruction, as well as a survey completed by students relative to their specific course format experience.

The purpose of this study was to provide an investigation of special education teachers who serve or have served students with autism, by evaluating the knowledge of educational practices and skills needed to effectively serve students with autism prior to their participation in a graduate course, and then immediately following the completion of the course in order to evaluate their own

perceptions of their knowledge and skill level obtained during the course. In addition to their personal perception of knowledge and skills that were acquired, students also completed assessments relative to topics addressed in the course. In addition, each student completed a survey relative to their particular experience, giving them an opportunity to provide their perceptions of effective elements and barriers to the respective format of instruction in which they participated. More specifically, the major goals of this study were to:

1. Compare the level of knowledge of the participants prior to their participation in the course, and then following the course, and which variables, if any, had an impact on student learning with respect to their format of instruction.

2. Compare the assessment scores of students who participated in the online format of instruction with those who participated in the face-to-face format of instruction.

3. Evaluate the factors participants in both formats of instruction indicated as significant to their ability to effectively learn the course materials presented. Were these factors those previously identified in previous studies? Are there additional factors or variables that impact the acquisition of knowledge and skills for educators working with students with autism spectrum disorders?

4. What were practitioner's perceptions of the components of online or face-to-face coursework that increased their knowledge and skills in the area of autism spectrum disorders?

5. What were the factors, if any that students identified as barriers to online learning when compared to traditional face-to-face coursework?

The number of students with autism being served in Missouri schools continues to rise. The chronic shortage of special education teachers, and the lack of specific training in the knowledge and skills necessary to provide appropriate services to those students continues to be a problem for districts, administrators, teachers, and families across the state. While there are a variety of professional development opportunities offered in the state, there is no specific teacher certification requirement for specialized training in the area of autism, while the specific needs of this unique population remain. It is out of direct response from legislators, parents, administrators, and educators that Missouri Western State University chose to move forward with a plan to provide specific training in the area of autism spectrum disorders. Graduate students may now pursue a master's degree in applied science assessment with an option in autism spectrum disorder (33 credit hours). Students may also choose to complete a graduate certificate program in autism spectrum disorders that consists of 6 courses (18 credit hours) specifically related to the most common areas of need for teachers who work with

students with autism spectrum disorders. Both of the programs have gone through the necessary processes and have received approval by the Missouri Department of Higher Education.

While most courses at Western are offered in the traditional face-to-face format of instruction, like many other universities, Western is moving into the era of online learning instructional formats. While informal discussions with various organizations and local district personnel led the university to believe there would be enough students to provide the program in a face-to-face format of instruction, just as the current master's degree option in Education is provided, the need remained to provide instruction to districts and families who did not live in areas close to campus, or whose schedules made it difficult to attend courses. The need for training in this specialized area remained. It was decided that a pilot, or field testing, of both formats of instruction would be offered in the fall 2009 semester, and the first course in the sequence of the program would be offered. Enrollment was low due to limited ability to advertise the program, as final state approval had not yet been received prior to the beginning of the semester.

The purpose of the Fundamentals of Autism Spectrum Disorders course is to provide an understanding of Autism Spectrum Disorders (ASD) and their effect on life and learning; as well as a comprehensive overview of the history, current thinking, issues and practices. The course will examine autism and Asperger

syndrome, educational criteria, identification and assessment, personal perspective, and teaching strategies. Broad areas to be covered in this course include: the breadth and variability of ASD characteristics; how multiple disciplines interact around ASD issues; how ASD effects learning, socialization, perceptions, communication, sensory processing and thinking; life span issues (from early childhood to adulthood); and, the perspective of individuals with ASD, as well as their family members.

Research Design

A mixed methods design was used to collect both quantitative data as well as qualitative data. The combination of both forms of data provides a better understanding of which aspects of educating teachers to work with students with autism spectrum disorders were most effective for these groups of participants.

Participants

The participants targeted for this study were all students enrolled in the two sections of the Fundamentals of Autism Spectrum Disorders course in the Fall, 2009, semester at Missouri Western State University. There were seven students enrolled in the face-to-face section of the course, and, originally, there were six students enrolled in the online format of the course. One student in the online section was forced to drop the course due to unexpected health problems.

All students were female. All 12 students completed the pre and post survey. Nine assessments and a cumulative final assessment were completed online by all participants in both sections, and each participant completed a final survey relative to their particular course participation experience.

The first survey students were asked to complete was the *General Competencies in Autism Spectrum Disorders (ASD)*. This questionnaire was created for the purpose of this study, and was based on a compilation of the general knowledge and skills competencies required for licensure in those states where a licensure in autism exists. The states with educational standards that were used in development of this instrument were:

1. California: *Best Practices for Designing and Delivering Effective Programs for Individuals with Autistic Spectrum Disorders (1997);*
2. Florida: Specialization Requirements for Endorsement in Autism (2006);
3. Iowa: *Iowa Best Practice Guidelines for Personnel who Plan Programs for Individuals with Autism and Related Disorders (1999);*
4. Michigan: *Program Competencies for Special Education Programs and Services* (2005);

5. Minnesota: *Proposed Competencies for Special Education Teachers Working with Students with Autism Spectrum Disorders* (2003);

6. New York: *Autism Program Quality Indicators* (2001); and

7. Virginia: *Skill Competencies for Professionals and Paraprofessionals Supporting Individuals with Autism Across the Lifespan.*

Self-assessments are a widely used method of evaluation in educational and social research. They have been used to measure any array of teacher qualities, including knowledge of instructional practices. (Begeny & Martens, 2006: Darling & Gallagher, 2003), implementation of instructional practices (Agran & Alper, 2000; Darling & Gallagher, 2003; Sfard, 2005; Vernez, Karam, & Mariano, 2006) and training needs (Buell, Hallam, Gamel-McCromick, 1999); Johnson & Synder, 1986). Data obtained from self-assessments have been found to provide accurate and reliable measures of teacher practices (Blank, 2005). Such measures provide information that can be used to document changes in skills and competencies over time, create training initiatives, and help individuals identify and understand their specific needs (Darling & Gallagher, 2003). The *General Autism Spectrum Disorders Competencies* survey was created for the purpose of this study. Items were chosen based on a combination of the course objectives and competencies in place in states with licensure in autism. Some items were adapted from the Knowledge of Autism Spectrum Disorders Self-

Assessment (VDOE T/TAC, 2006). There were a total of sixteen questions that comprised the proficiency area of "General Autism." For this survey, participants were asked to rate their level of knowledge in specific general autism areas as this course is an introductory course, and course expectations and objectives are based on the acquisition of basic knowledge in the area of autism. Examples of items from the survey included rating a participants understanding of "the characteristics and diagnosis of autism as defined by the most recent version of the Diagnostic and Statistical Manual of Mental Disorders," and understand "social skills development and the unique social skill deficits and challenges associated with ASD."

Participants provided a self-rating of their knowledge level in each of the sixteen areas using a six-point Likert scale. When rating their current level of knowledge, one represented "no awareness of knowledge" and six "I have knowledge, competency and ability at an independent level" with respect to their knowledge level of each item. A list of the items contained in the *General Autism Spectrum Disorders Competencies* survey can be found in Appendix B.

The survey was web based and was administered through Class Climate. Each student was sent a computer-generated password via their school email account that allowed the student access to the survey. Each student was asked to enter their birth date and the last four digits of their social security number in

order maintain anonymity, but still allow for identification of survey results in order to compare the pre-survey results with the post-survey scores. Benefits of web based survey use, has been documented by research. Benefits include ease of use, rapid turn-around time, as well as an increased response rate in comparison to surveys disbursed through postal mail (Cook, Heath, & Thompson, 2000), as well as the saving the cost of postage.

Prior to opening the survey to students, the *General Autism Spectrum Disorders* survey was field tested. A total of 7 individuals were asked to complete the survey. All individuals were familiar with autism, and had varying levels of education and experience in special education, ranging from PhDs to recent graduates with certification in special education. All individuals were asked to comment on several things: Are the instructions clearly written? Are questions easy to understand? Are response options easy to understand? Are there any suggestions for clarifying instructions, questions, or response options? All responders felt instructions were clear and response options were easily understood. There were a couple of changes made to question wording to better clarify meaning for the participant.

Since both sections were taught by the same instructor, measures were taken to avoid the interference of personal bias with this research project as much as possible. All participants utilized the same text, *Learners on the Autism*

Spectrum: Preparing Highly Qualified Teachers (Buron & Wolfberg, 2008). All other materials provided throughout the course were provided and accessed by students via the internet. All students were provided the same powerpoint slides, and the same additional materials. While all students were provided all materials, only the powerpoint presentation provided by the publishing company was discussed in the face-to-face course, and all students were only assessed on the materials directly related to the information covered in the text. All assessments were completed online by participants in both the online and face-to-face sections of the course, and all assessments were developed by the publishing company. Questions were presented in a true/false, multiple choice, or short answer format, and scored by the computer. Students in each section were required to participate in discussion threads relative to course topics. Discussion threads were the same for both groups, and each group participated in these discussions with their respective sections. The instructor also participated in these discussions.

A survey was developed for both groups by the instructor based on the specific learning experiences of both groups. Students were surveyed as to their perceptions of the personal experiences in the course, and questions were directly related to the online or face-to-face experience of the course, respectively. Some questions were formatted requiring a yes/no response, while others utilized a 5-point Likert scale, and open-ended questions regarding the students' experiences with the course. Both surveys collected demographic data that included: age

range, years of teaching experience, and experience with students with autism. Both surveys contained questions specifically related to each experience in order to obtain information that was perceived as a benefit or barrier to each experience. The forced choice and Likert scale questions focused on student satisfaction with their online course experience, interaction with the instructor and classmates, and perspectives comparing their online course experience to previous face-to-face courses. The face-to-face survey contained similar type questions as well as some questions that related to the online portions of the course, such as the discussion threads and completion of the assessments. Both surveys contained questions asking students to identify the benefits and disadvantages to taking the course either online or face-to-face. Surveys were completed by all students enrolled in each section of the course.

Procedures

Permission to collect data from both of these courses was obtained through Missouri Western State University's Committee on the Use of Human Subjects/Institutional Review Board (CUHSR/IRB) prior to the beginning of the courses in August, 2009. The research questions were determined from a review of literature and research regarding online learning, special education teacher preparation, and autism education and services.

Data Collection

The *General Autism Spectrum Disorders Competencies* survey was provided online to all students when the semester began via an email request to complete the survey and an online announcement to all students enrolled in both course sections was provided via WebCT. The email notice included an explanation of the purpose of the data collection, and human subject consent information. Participation was voluntary and students were notified that their participation would not impact the grade they earned in the course. At the completion of the course the *General Autism Spectrum Disorders Competencies* survey was again sent to all students via an email request and an online announcement to all students enrolled in both course sections was provided via WebCt. All students in both sections of the course chose to participate.

In addition to completing the *General Autism Spectrum Disorders Competencies* survey prior to, and following the course, students were asked to complete a survey relative to their specific experience in the course. The online survey and the face-to-face surveys obtained demographic information, their previous experience with children with autism as well as information directly related to the particular format of course instruction. Throughout the course of the semester, all students completed 9 assessments that measured academic achievement in the course. All forms of assessment and survey instruments were administered and scored via the internet for both sections of the course, and the surveys were analyzed by an external evaluator. Students in both sections of the

course were able to link to the surveys from the internet using a password that was sent to each student via their university email account containing a password randomly selected via the Class Climate survey instrument employed by the university. All student feedback was kept confidential by the Instructional Technology director for the university, in that no names or identifying information was shared with the instructor. Thus, students were encouraged to provide open and honest feedback regarding their experiences in the course.

Data Analysis

All survey data was exported from Class Climate using Microsoft Excel. Data was analyzed using a statistical software package for Social Sciences (SPSS 15.0) when appropriate. All data were reviewed for accuracy and completion. Survey responses included demographic data, forced choice, Likert scale and open-ended questions. The purpose of descriptive statistics is to accurately describe the data from a variable (Green & Salkind, 2003). Upon a preliminary review of the survey results indicated that 75% of both groups of students had previously taken an online course prior to their participation in the Fundamentals of Autism course, there was a wide range in the age of participants, and a range of experience in working directly with students with autism. A review of literature suggested that age and previous online experience may influence students' online experience (Koohang, 2004: Rovai, 2001; Woodill, 2004; Wyatt, 2005). Some

researchers reported that there are many factors than can influence learning success, and age is one of these factors (Woodill, 2004; Wyatt, 2005). Wyatt (2005) reported finding an association between age and perception that online instruction provided a quality experience. Woodill (2004) suggested there is a difference in the over-40 year old and under-40, indicating that because of the exposure and use of technology that people under- 40 think differently. Woodill (2004) suggested that people under 40 have shorter attention span and that these factors may affect their experience with online learning. In addition to age, another factor that may affect a persons' online learning in the level of previous technology experience (Koohang, 2004; Rovai, 2001). Rovai (2001) indicated that students with previous online course experience may interact more compared to students without previous experience. Comparisons were conducted to determine if age, previous online experience, or previous experience with students with autism may help to explain the variability in participant responses. Individual assessment scores were obtained via WebCt for both the online and face-to-face course participants. Individual and group averages were calculated for each assessment, and percentages were recorded. Data was analyzed for each participant's demographic and additional information, and compared to their individual and group assessment scores.

Reliability was evaluated to determine the internal consistency of scores obtained on the pre and post survey (the *General Autism Spectrum Disorders*

Competencies), as well as each of the final surveys completed by the online and face-to-face participants. Reliability was conducted by calculating the Cronbach's Alpha coefficient for each instrument. Cronbach's Alpha coefficient determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability. The internal consistency was evaluated for each of the Likert scale question sections for each of the three survey instruments that were developed for this study by determining the coefficient scores from the level of knowledge of the General Autism Spectrum Disorders Competencies, the Face-to-Face final survey, and the Online final survey.

A Mann-Whitney U test was conducted for the General Autism Spectrum Disorders Competencies survey comparing the results of both the online and face-to-face groups prior to the course, immediately following the course, as well as the amount of knowledge gained by each group. A paired samples t-test was conducted comparing the mean scores of the pre and post surveys for the online course participants and the pre and post scores for the face-to-face course participants on the General Competencies survey. Mean scores for pre and post responses for each question were graphed for each group of students as well an overall comparison of mean scores between the two groups of students.

Both groups of students completed nine assessments related to various topics discussed during the course, and a cumulative final exam. Both groups of

students completed each assessment via the internet through WebCt, and all assessments were computer scored. Responses for open-ended items on the final surveys for both groups of students were compiled. Data was also obtained as to each participant's perspective relative to their particular format of instruction in a variety of areas, and demographic data obtained was gathered and described in Chapter Four.

Chapter Four: Results

This chapter describes the results of the research study. First, the results of internal consistency analysis regarding the reliability of the Likert scale items on the three surveys involved in this research project are reported. This is followed by the results of the pre and post *General Autism Spectrum Disorders Competencies* survey, including a breakdown of the results of each survey item. This analysis will include looking at the overall gains of each group of students as well as self-reported individual gains. Second, the results of the individual online and face-to-face surveys are described, including demographic variables of participants, which include participant's age, years of teaching experience, and number of students with autism they have worked with directly. Third, the assessment results of both groups of students, as well as individual student scores on the nine topic assessments, and the cumulative final will be presented. This section will finish with the overall results of the increase between the pre and post surveys presented with participant's demographic information.

Survey Results

This section begins with the results of the internal consistency analysis to report the reliability of the three surveys involved in this research study. Reliability coefficienst can be estimated using the method to test for internal consistency (Green & Salkind, 2003). Cronbach's Alpha is the most commonly

used statistical index for internal consistency (Portney & Watkins, 2000). An analysis of consistency was conducted with the items on the *General Autism Spectrum Disorders* survey, as well as the Likert-scale item sections contained in the online final survey and the face-to-face final survey that students were asked to complete relative to their course format of instruction experience. The Cronbach's Alpha for the *General Autism Spectrum Disorders Competencies* survey was .960, the online final survey was.718, and on the face-to-face survey, a .747 was obtained following the removal of three items. Cronbach's Alpha reliability coefficient normally ranges between 0 and 1. The closer Cronbach's Alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. It is generally accepted that a coefficient score that is greater than 0.7 is an acceptable reliability coefficient (Nunnally & Bernstein, 1994). Low values on the Cronbach Alpha in the Corrected Item-Total Correlation column (below .3) indicate that the item is measuring something different than the scale as a whole. The Cronbach's Alpha, If Item Deleted Column, indicates the impact removing an item would have on the overall Cronbach's Alpha coefficient. After removing the three items with significantly low Item-Total Correlations (-.248, -.392, and-.128) a Cronbach's Alpha of.747 was obtained for the face-to-face final survey.

General Autism Spectrum Disorders Competencies Survey Results

Of the twelve students enrolled in the Fundamentals of Autism Spectrum Disorders courses, 5 in the online format and 7 in the face-to-face format, all students agreed to participate. Written confirmation of their permission and commitment was obtained from each student prior to gathering data.

On the first day of data collection, survey information was sent electronically to each participant in the courses via their university email address, along with a password that allowed them access to the survey. Pass codes were randomly generated for each student via the university's online survey instrument provider. All identifying information for each student remained anonymous to the researcher. Participants in all surveys and assessments were identified using the student's birth date and last four digits of their social security number. This is not information that the researcher has access to as a university faculty member. All twelve students completed the pre-survey, and then at the completion of the course each student completed a post survey. Items on the pre and post surveys were identical, and surveys were the same for both groups of students. Student responses on each instrument were matched via their identifying information. Table 4.1 provides detailed information about the survey responses completed by the face-to-face participants and Table 4.2 provides detailed information about the survey responses completed by the online participants. The tables outline the

number of participants in each course, face-to-face and online, respectively. In addition, these tables delineate the mean score for each survey item on the pre-survey, the mean score for each survey item on the post survey, the mean gains between the pre and post survey for each survey item, the standard deviation for each survey item on the pre and post survey for each item, the median for each survey item on the pre and post surveys, and the mode for each survey item on the pre and post surveys. The complete descriptor of each item listing for these tables can be found in Appendix B. The average score for all sixteen items for the face-to-face participants was 2.18 on the pre-survey, and 5.34 on the post survey, resulting in an average gain for the group of +3.16 for the course. The average score for all sixteen items for the online participants was 3.28 on the pre-survey, and 5.50 on the post survey, resulting in an average gain of +2.25 for the course. The self-assessed knowledge level of the face-to-face students prior to the beginning of the course (2.18) was lower than the self-assessed knowledge level of the online students (3.28) prior to the beginning of the course. The average general knowledge gain was also greater for the face-to-face students (3.16) than the online students (2.25), yet the average score of the knowledge level of students at the completion of the course was higher for the online students (5.50) than it was for the face-to-face students (5.34). Overall, the students in the online course had more prior knowledge as indicated on the *General Autism Spectrum*

Disorders survey prior to participating in the course, but they also obtained more knowledge by the end of the course than the face-to-face participants.

Mean Scores for Pre/Post Face-to-face Course

1 – No awareness or knowledge

2 – I recognize the terms but couldn't give meaning or apply the principles

3 – I think I know this, but not using this terminology

4 – I am at an awareness level of this

5 – I have knowledge of this, but need support

6 – I have knowledge, competency and ability at an independent level

Question Item	Pre	Post	Gains	SD P/Post	Med P/Post	Mode P/Post
Item One	2.71	5.57	+2.86	.951/5.35	2/6	2/6
Item Two	1.71	5.14	+3.43	.951/.690	1/5	1/5
Item Three	1.57	5.43	+3.86	.535/.787	2/6	2/6
Item Four	2.57	5.57	+3.00	1.813/.535	2/6	1/6
Item Five	2.14	5.14	+3.00	1.676/.378	1/5	1/5
Item Six	2.71	5.57	+2.86	1.604/.535	2/6	2/6
Items Seven	2.14	5.14	+3.00	1.345/.690	2/5	1/5
Item Eight	1.86	5.29	+3.43	.378/.756	2/5	2/6
Item Nine	1.57	5.29	+3.71	1.134/.488	1/5	1/5
Item Ten	2.86	5.43	+2.57	1.215/.535	2/5	2/5
Item Eleven	2.14	5.14	+3.00	.690/.690	2/5	2/5
Item Twelve	2.43	5.29	+2.86	1.134/.756	2/5	2/6
Item Thirteen	2.14	5.29	+3.14	1.345/.756	2/5	1/6
Item Fourteen	2.14	5.29	+3.14	1.464/.756	2/5	1/6
Item Fifteen.	2.14	5.57	+3.43	1.464/.535	2/6	1/6
Item Sixteen	2.00	5.29	+3.29	1.414/.488	2/5	2/5
Average	2.18	5.34	+3.16		2	

Table 4.1

Mean Scores for Pre/Post Online Course

1 – No awareness or knowledge

2 – I recognize the terms but couldn't give meaning or apply the principles

3 – I think I know this, but not using this terminology

4 – I am at an awareness level of this

5 – I have knowledge of this, but need support

6 – I have knowledge, competency and ability at an independent level

Question Item	Pre	Post	Gains	SD P/Post	Med P/Post	Mode P/Post
Item One	3.00	5.00	+2.00	.707/.707	3/5	3/5
Item Two	2.20	5.20	+3.00	1.095/.447	3/5	3/5
Item Three	2.40	5.60	+3.20	.548/.894	2/6	2/6
Item Four	3.40	6.00	+2.60	.894/.000	4/6	4/6
Item Five	3.20	5.20	+2.00	1.304/.447	3/5	2/5
Item Six	3.60	5.60	+2.00	1.140/.548	4/6	4/6
Item Seven	3.20	5.80	+2.60	1.304/.447	3/6	2/6
Item Eight	2.40	5.20	+2.80	.548/.837	2/5	2/6
Item Nine	3.80	5.20	+1.40	.837/.837	4/5	3/6
Item Ten	4.40	5.80	+1.40	1.140/.447	4/6	4/6
Item Eleven	4.00	6.00	+2.00	1.414/.000	4/6	4/6
Item Twelve	3.60	6.00	+2.40	1.517/.000	3/6	3/6
Item Thirteen	3.80	6.00	+2.20	1.483/.000	4/6	4/6
Item Fourteen	3.40	5.20	+1.80	.548/1.304	3/6	3/6
Item Fifteen	3.20	5.20	+2.00	.837/.1.304	3/6	3/6
Item Sixteen	2.80	5.40	+2.60	.837/.548	3/5	2/5
Average	3.28	5.5	+2.25			

Table 4.2

The median, or middle value, for all sixteen items on the pre-survey for the face-to-face students is 2, while the median on the pre-survey for the online

students is 3. The median for the face-to-face students on the post survey is 5, and the median for the online students is 6. The mode, or the number that is repeated more often than any other, for all sixteen items on the pre-survey for the face-to-face students is 2, and the mode for the online students on the pre-survey is 3. The mode for the face-to-face students on the post survey is 5, while the mode for the online students is 6.

The standard deviation is a statistic that indicates how tightly all the various examples are clustered around the mean in a set of data. It measures variation around the mean. Some values may be below the mean, some above and sometimes some are equal to the mean. When the examples are pretty tightly bunched together and the bell-shaped curve is steep, the standard deviation will be small. A large standard deviation curve is relatively flat. All standard deviations for each survey item on the pre and post surveys for both the online and face-to-face participants were positive, or more than the mean score obtained for each item. The standard deviation between the pre and post surveys for the face-to-face students decreased on 81% (13) of the items scored, increased on 13% (2) of the items scored, and remained the same on 6% (1) of the items scored. The standard deviation between the pre and post surveys for the online students decreased on 63% (10) of the items scored. Of that 63% the standard deviation for 40% (4) items went to 0.00. The standard deviation increased for 25% (4) of

the items scored, and the standard deviations for 13% (2) of the items remained the same between the pre and post survey scores for the online students.

A Mann-Whitney *U* was conducted on the item scores for the pre-survey of the face-to-face course compared the item scores indicated by students in the online course. The post survey comparing both groups, and the gains that were made on each item between both groups were also analyzed between both groups of students using the Mann-Whitney *U*.. The Mann-Whitney *U* is a non-parametric test. Unlike the parametric t-test, this non-parametric test makes no assumptions about the distribution of data (Siegel, 1956).. It is the alternative test to the t-test. It is used to compare two population means that come from the same population, and is used to test whether two population means are equal or not (Corder & Foreman, 2009). The Mann-Whitney *U* test evaluates whether the medians on a test variable differ significantly between two groups. For a Mann-Whitney *U* test, the scores on the test variable are converted to ranks, ignoring group membership (Green & Salkind, 2005). The test then evaluates whether the mean ranks for the two groups differ significantly from each other. Like many non-parametric tests, the Mann-Whitney *U* uses the ranks of the data rather than their raw values to calculate the statistic. Since this test does not make a distribution assumption, it is not as powerful as the t-test. In this case, the test evaluates whether the mean rank of the face-to-face group differs significantly from the online group on the pre-survey, the post survey and the gains that were

made between the two groups for each survey item. In order to apply the Mann-Whitney *U* test, the raw data from the face-to-face course and the online course are combined into a set of elements, which are then ranked from lowest to highest. These rankings are then re-sorted into two separate samples. Due to the small sample size a significance level of 0.15 was used when analyzing significance between the two groups on each of the Mann-Whitney *U* comparisons that were conducted. Table 4.3 provides the items that were significant in each area. The items correspond to the items that are listed in Appendix B . There was one item that obtained a significant score on the pre-survey, the post survey, and the gain comparisons. That item was #11, I understand a variety of strategies to increase an individual's communication abilities.

Mann-Whitney *U* Test Statistics

Pre-survey Face-to-Face Compared to Online

Item	3	8	9	10	11	12	13	14	15	16
Mann-Whitney *U*	6.000 ··	9.000 ··	3.000 ··	6.000 ··	4.000 ··	9.000 ·	7.000 ··	6.500 ··	8.000 ·	8.000 ·
Asymp. Sig. (2-tailed)	.035	.069	.014	.055	.022	.148	.078	.066	.114	.106

··p < 0.10; ·p < 0.15

Post Survey Face-to-Face Compared to Online

Item	1	4	7	11	12	13
Mann-Whitney *U*	9.500·	10.000·	8.000··	5.000··	7.500··	7.500··
Asymp.Sig. (2-tailed)	.148	.106	.086	.021	.051	.051

··p < 0.10; ·p < 0.15

Gains Face-to-Face Compared to Online

Item	1	5	8	9	10	11	14	15
Mann-Whitney *U*	7.000¨	8.500˙	8.000¨	2.000¨	7.000¨	9.000˙	7.500¨	7.500¨
Asymp.Sig. (2-tailed)	.066	.127	.064	.010	.078	.146	.082	.095

Table 4.3 ¨p < 0.10; ˙p< 0.15

A paired-samples t test was also conducted using a repeated-measure design with an intervention comparing the pre and post survey scores of the face-to-face participants with the pre and post survey scores of the online participants. A paired-sample t-test compares the means of two variables for a single group. The procedure computes the differences between the values of the two variables for each case and tests whether the average differs from zero. The test's output statistics include for each variable of the pair, calculations of the mean, samples size, standard deviation, and standard error of the mean. The pair samples correlations include correlation and significance level. The t-test's output itself includes difference in means, standard deviation, and standard error of the mean difference, confidence interval for mean difference, the t statistic, the degrees of freedom (df) and the significance level. Table 4.4 provides the mean difference between the pre and post surveys for the face-to-face students and Table 4.5 provides the mean difference between the pre and post surveys for the online course. All items are significant at the $p < .05$ level and the $p < .01$ level for the face-to-face students. All items are significant at the $p < .05$ level for the online course except for item 9, I understand the impact of common medical issues for

persons with autism, and 48% (7) of the items are also significant at the $p < .01$ level.

Paired Samples Test

Pre and Post Survey Comparisons Face-to-Face Course

Pair Item	P. D. Mean	Sig. (2-tailed)
1	-2.857¨	.000
2	-3.429¨	.000
3	-3.857¨	.000
4	-3.000¨	.002
5	-3.000¨	.001
6	-2.857¨	.005
7	-3.000¨	.001
8	-2.857¨	.000
9	-3.714¨	.000
10	-2.571¨	.001
11	-3.000¨	.000
12	-2.857¨	.000
13	-3.143¨	.001
14	-3.143¨	.000
15	-3.429¨	.000
16	-3.286¨	.000

Table 4.4 ¨$p < .01$; ˙$p < 05$

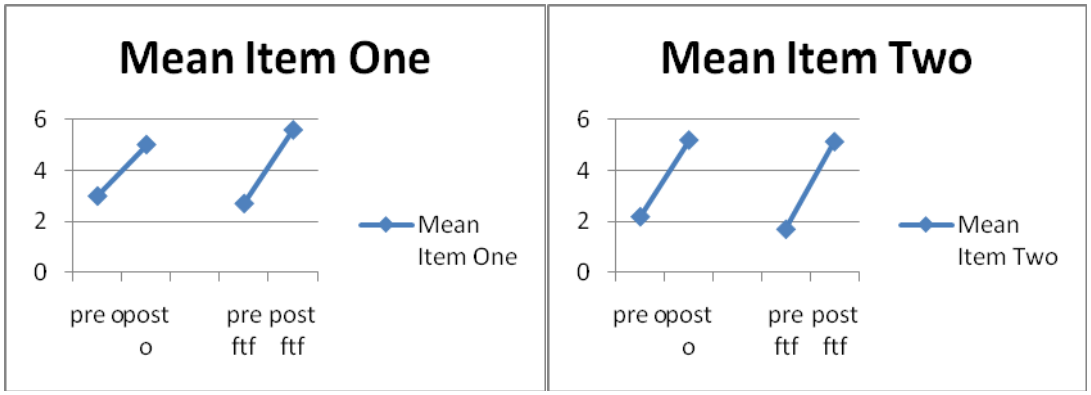
Pre and Post Survey Comparisons Online Course

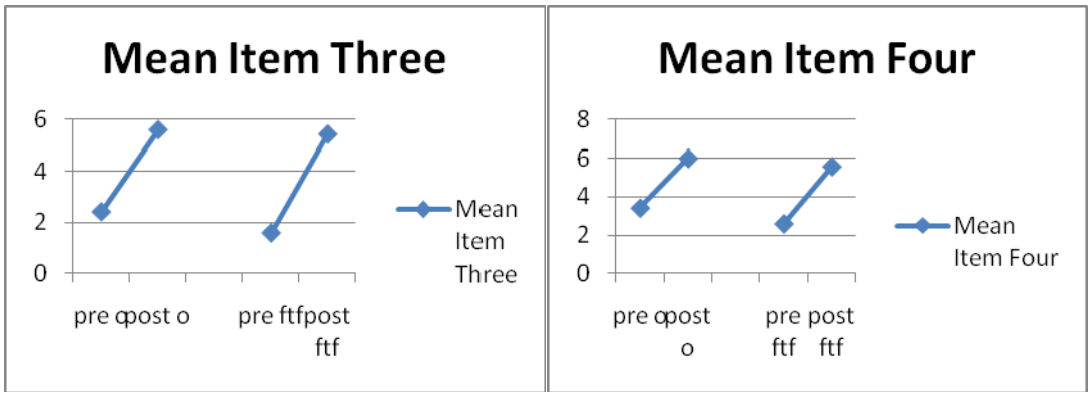
Pair Item	P.D. Mean	Sig. (2-tailed)
1	-2.000¨	.003
2	-3.000¨	.003
3	-3.200¨	.001
4	-2.600¨	.003
5	-2.000˙	.034
6	-2.000˙	.011
7	-2.600¨	.007
8	-2.800¨	.000
9	-1.400˙	.025
10	-1.400˙	.034
12	-2.400˙	.024
13	-2.200˙	.029
14	-1.800˙	.037
15	-2.000˙	.034
16	-2.600¨	.000

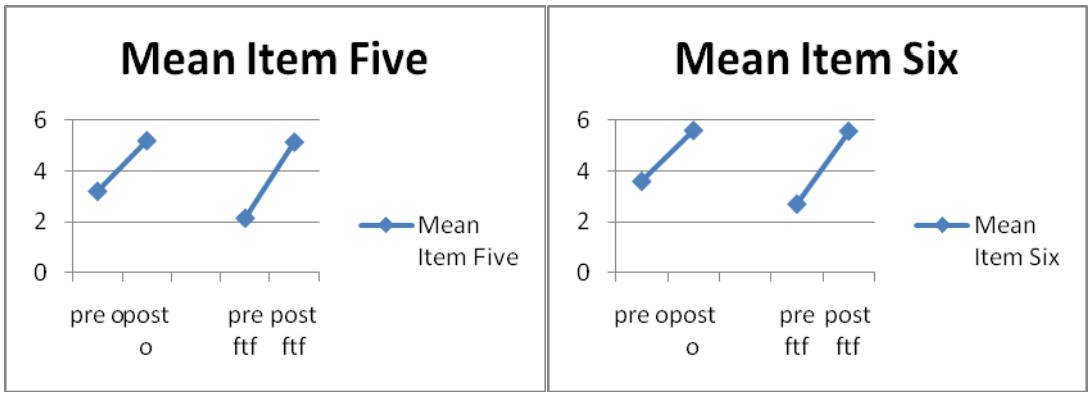
Table 4.5 ¨p < .01; ˙p < 05

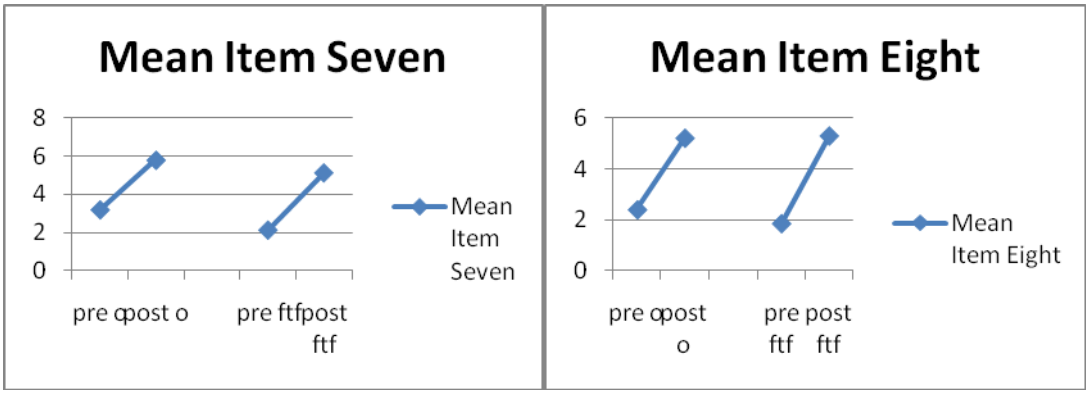
Table 4.5 contains a graph of the mean scores on the pre and post survey items scored by participants in the online format of the course and participants in the face-to-face section of the course. There is a graph for the mean scores for

each of the sixteen items contained in the surveys indicating the gains on each survey item between the pre and post surveys, and for both formats of instruction.








Mean Item Seven
8
6
4
2
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pre opost o
pre ftfpost ftf
Mean Item Seven
Mean Item Eight
6
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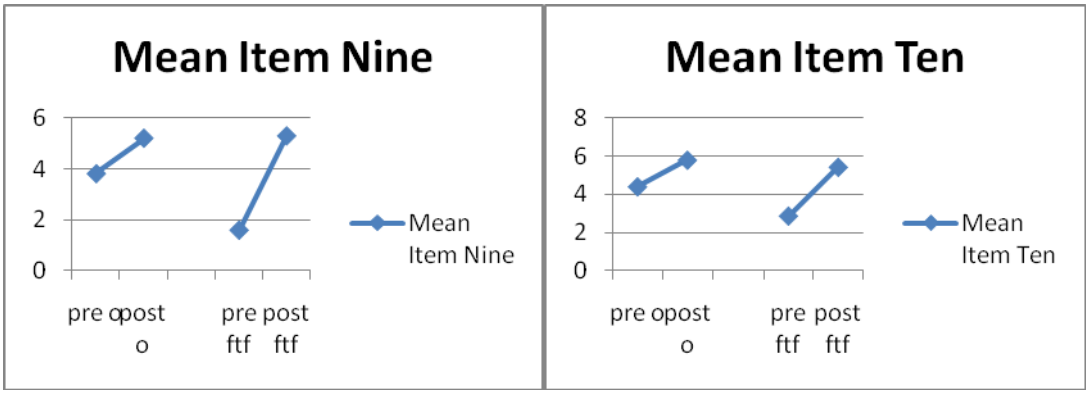
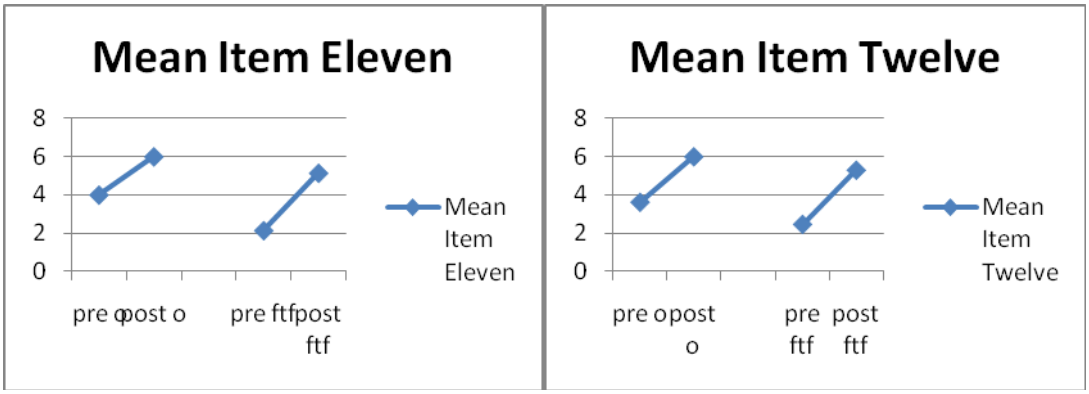
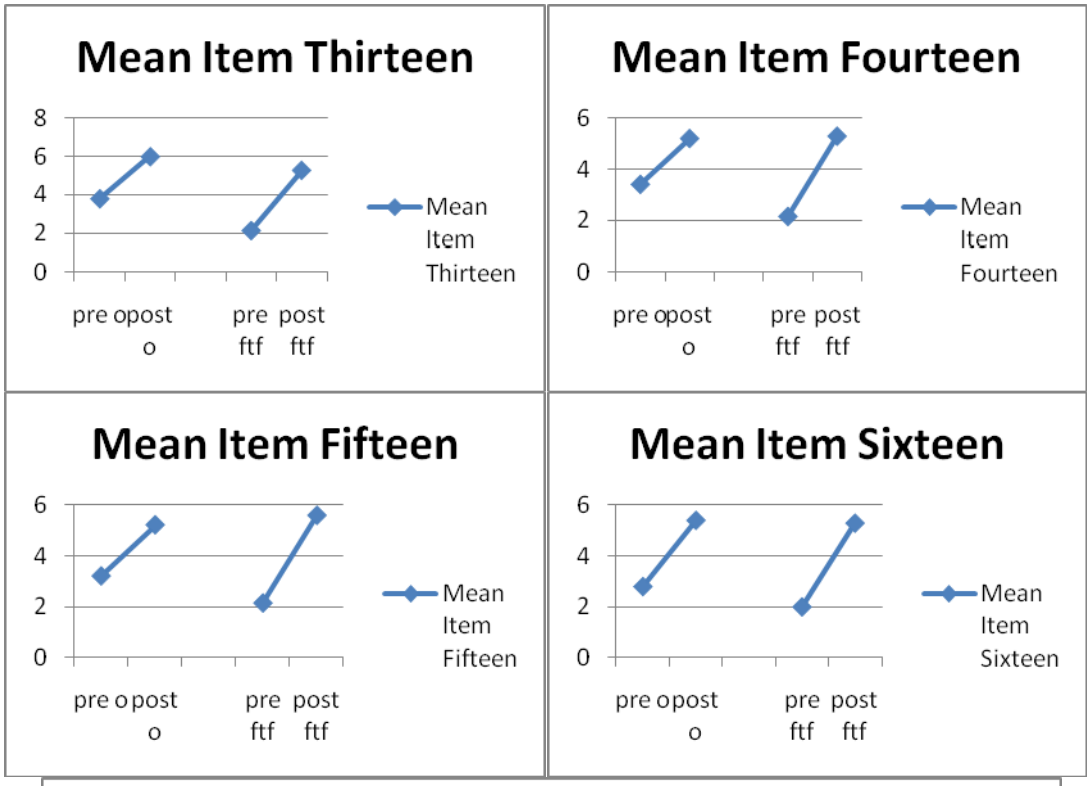
pre post ftf ftf
Mean Item Eight


Mean Item Nine
6
4
2
0
pre opost o
pre post ftf ftf
Mean Item Nine
Mean Item Ten
8
6
4
2
0
pre opost o
pre post ftf ftf
Mean Item Ten


Mean Item Eleven
8
6
4
2
0
pre opost o
pre ftfpost ftf
Mean Item Eleven
Mean Item Twelve
8
6
4
2
0
pre opost o
pre post ftf ftf
Mean Item Twelve


Mean Item Thirteen
8
6
4
2
0
pre o
post o
pre ftf
post ftf
Mean Item Thirteen
Mean Item Fourteen
6
4
2
0
pre o
post o
pre ftf
post ftf
Mean Item Fourteen
Mean Item Fifteen
6
4
2
0
pre o
post o
pre ftf
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Mean Item Fifteen
Mean Item Sixteen
6
4
2
0
pre o
post o
pre ftf
post ftf
Mean Item Sixteen

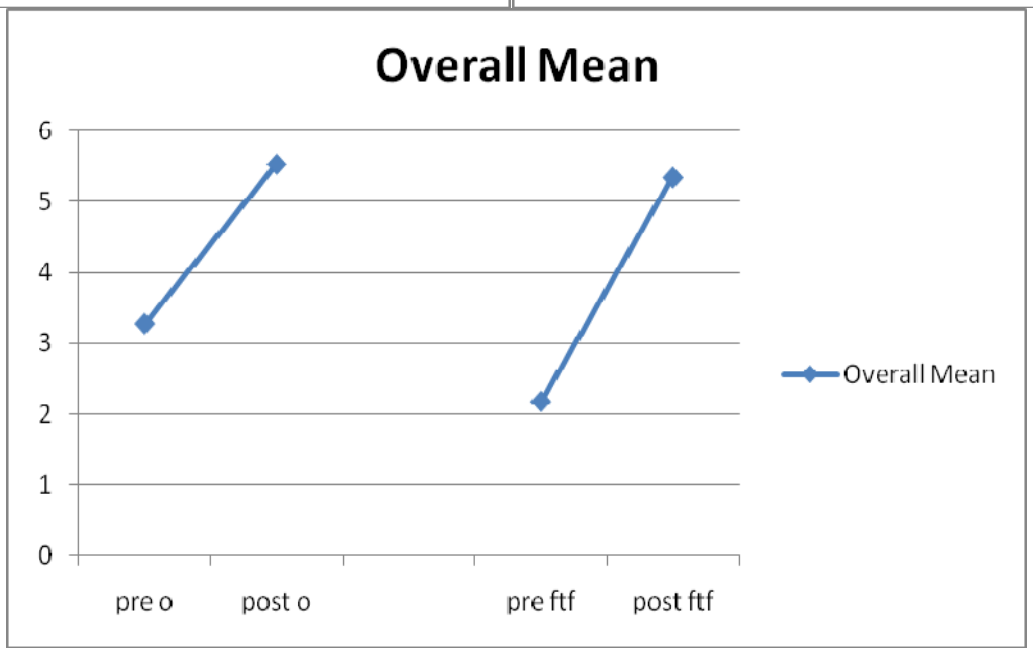
Overall Mean
6
5
4
3
2
1
0
pre o
post o
pre ftf
post ftf
Overall Mean

Table 4.6

Face-to-Face Course Survey Results

All students enrolled in the face-to-face section of the Fundamentals of Autism Spectrum Disorders course agreed to complete a survey following the completion of the course to obtain feedback on their experience in the format and structure of the course. Permission to use their responses for research purposes was obtained from all students prior to their completion of the survey. Students were sent the survey via their university email account along with a pass code in order to access the survey. Students used their birth date and the last four digits of their social security number to identify themselves. University instructors do not have access to that information. Demographic data was obtained relative the participant's age, years of teaching experience, and their direct experience with students with autism. All participants (7) were female. The distribution by age was: 2 (29%) were 18-23; 2 (29%) were 30-35; 1 (14%) was 48-52; 2 (29%) were 53 – 58. The distribution by years of teaching experience was: 2 (29%) 0-3 years; 1 (14%) 4-7 years; 2 (29%) 8-11 years; 1 (14%) 12-15 years; 1 (14%) 23-27 years. Four students (57%) had direct experience working with 0-5 students with autism, and three students (43%) had direct experience working with 6-10 students with autism.

Five students (71%) had previous experience with an online course before, and 2 (29%) had no previous experience. See Appendix C for a complete

summary of the Face-to-Face Student Survey Data. Although the course materials presented were in a face-to-face format of instruction, assessments were completed online, and students were required to participate in discussion threads via the internet. Three (43%) of the students indicated they requested technical support for this course. No one indicated they requested help from the university Instructional Technology center. All students, 7 (100%), indicated they received technical support from the instructor and 1(14%) indicated she received technical support from someone else not related to the university. All seven students (100%) felt their level of computer expertise was adequate to participate effectively in the online portions of the course.

Seven students (100%) reported that they strongly agreed or agreed that they would like to take another face-to-face course with the same types of online components. When asked if they thought the course would have covered more material if it had been offered entirely online, one person (14%) agreed, and 6 people (86%) strongly disagreed or disagreed. All seven (100%) either strongly disagreed or disagreed that they would have interacted more with the instructor if they had taken this course completely online. Six participants (86%) strongly disagreed or disagreed that taking this course face-to-face was more challenging than taking it completely online, and one person (14%) neither agreed nor disagreed.

Six students (86%) either strongly agreed or agreed that they participated more in this face-to-face course than they feel they would have if they had taken it completely online. The next several items related to their level of participation in the discussion thread portions of the course. Six (86%) of the students feel they participated more in the discussion portion of the course than they usually do in a face-to-face course because they felt anonymous. Five students (81%) of the students strongly disagreed or disagreed that they participated more in the discussion thread portion of the course than they usually do in a face-to-face course because they felt more freedom to express their ideas. One student (14%) agreed that she participated more in the discussion thread portion of the course than she usually does in a face-to-face course because she felt more freedom to express her ideas. Two students (28%) strongly agreed or agreed that they participated more in the discussion thread portion of the course than they usually do in a face-to-face course because they felt more comfortable writing than talking, and four students (57%) strongly disagreed or disagreed that they participated more in the discussion thread portion of this course than they usually do in a face-to-face course because they felt more comfortable writing than talking. Three students (43%) felt they participated more in the discussion thread portion of this course than they usually do in a face-to-face course because they had time to think about how they wanted to express their opinion about a particular matter. Three students (43%) strongly disagreed or disagreed that they

participated more in the discussion thread portion of the course than they usually do in a face-to-face course because they had time to think about how they wanted to express their opinion relative to a specific topic.

Six students (86%) feel they participated more during in-class discussions as compared to the online discussion threads related to this course. Six students (86%) felt that a valuable part of this face-to-face course was the additional interactions with classmates through the discussion threads. All seven students (100%) found the in-class discussions more valuable than the online discussion threads.

All seven students (100%) strongly agreed or agreed that they were satisfied with their face-to-face course experience, and all seven students (100%) strongly agreed or agreed that taking the course face-to-face gave them more opportunity to interact with their classmates than if they had taken the same course completely online. Six students (86%) believe that the face-to-face course gave them a better learning opportunity than if they had taken the same course completely online.

All seven students (100%) said they spent less time involved in the threaded discussions as compared to class discussion in the face-to-face course. Six students (86%) indicated they spent more time interacting with the instructor in this face-to-face course as compared to their interactions with instructors in

other face-to-face courses, and all seven (100%) said they spent less time interacting with the instructor online as compared to face-to-face. In addition, all seven (100%) of the students said they spent more time interacting with classmates in this course as compared to their interactions with classmates in other face-to-face courses, and they spent less time interacting with classmates online than they did interacting with them face-to-face.

Students were asked if they felt there were additional session topics that could potentially be added to the course. Two students indicated there was nothing they felt could be added, and one person indicated that the instructor covered everything that was important for the course. Students were also asked if there were sessions that could potentially be dropped. Again, two students indicated there was nothing they felt could be dropped, and one person suggested that the brain basis information was pretty complicated, technical, and probably not necessary for teaching. Students were asked their opinion as to the barriers or disadvantages of online courses. One student indicated that she appreciated the input from the instructor as well as the other students about their experiences that often occurs in a face-to-face format of instruction. Another indicated that questions are not answered immediately and what is covered cannot be adjusted to meet student needs. Another commented that she felt that sometimes you feel like you are bothering the teacher, and sometimes you don't get responses immediately in online courses. One student believes that online courses require

more reading with less explanation of information, and she is an auditory learner. As to the benefits or advantages of online courses, one student said she would not have to drive so far, especially in bad weather. Three students made comments that were relative to the ability to fit your reading and work for the courses in to your own schedule when it is most convenient for you.

Online Course Survey Results

All students enrolled in the online section of the Fundamentals of Autism Spectrum Disorders course agreed to complete a survey following the completion of the course to obtain feedback on their experience in the format and structure of the course. Permission to use their responses for research purposes was obtained from all students prior to their completion of the survey. Students were sent the survey via their university email account along with a pass code in order to access the survey. Students used their birth date and the last four digits of their social security number to identify themselves. University instructors do not have access to that information. Demographic data was obtained relative the participant's age, years of teaching experience, and their direct experience with students with autism. All participants (5) were female. The distribution by age was: 1 (20%) was 24-29, and 4 (80%) were 48 and 52. The distribution by years of teaching experience was: 2 (40%) 0-3 years; 1 (20%) 12-15 years; 1 (20%) 28+ years. Two students (40%) had direct experience working with 0-5 students with autism,

one student (20%) had direct experience working with 6-10 students with autism, one student (20%) had direct experience working with 11-15 students with autism, and one student (20%) had direct experience working with 20+ students with autism.

Five students (100%) had taken on online course before. See Appendix D for a complete summary of the Online Student Survey Data. All course materials were presented via the internet through WebCT. All assessments were completed online, and students were required to participate in discussion threads via the internet. Two (40%) of the students indicated they requested technical support for this course. Two students (40%) indicated they requested help from the university Instructional Technology center. Four students (80%) indicated they received technical support from the instructor. All five students (100%) strongly agreed or agreed that their level of computer expertise was adequate to participate effectively in the course.

All five students (100%) reported that they strongly agreed that they would like to take another online course. When asked if they thought the course would have covered more material if the course had been face-to-face, two people (20%) strongly agreed or agreed, and 3 people (60%) strongly disagreed or disagreed. One student (20%) disagreed that she would have interacted more with the instructor if she had taken this course face-to-face, while 3 (60%) strongly

agreed or agreed that they would have interacted more with the instructor if the course had been face-to-face. Four participants (80%) strongly disagreed or disagreed that taking this course online was more challenging than taking it face-to-face.

The next several items related to student participation in the course. Three students (60%) either strongly agreed or agreed that they participated more in this online course than they usually do in a face-to-face course; one student (20%) disagreed. One participant (20%) agreed that she participated more in this online course than she usually does in a face-to-face course because she felt anonymous, while two students (40%) strongly disagree or disagree. Four students (80%) felt they participated more in this online course than they usually do in a face-to-face course because they felt they had time to think about how they wanted to express their opinions about a particular topic, and one student (20%) disagreed. Three students (60%) strongly agreed or agreed that they participated more in this online course than they usually do in a face-to-face course because they felt more comfortable writing than talking. One student (20%) strongly agreed that this online course gave her more opportunity to interact with her classmates than if she had taken the same course face-to-face, while 2 students (40%) disagreed.

All 5 students (100%) either strongly agreed or agreed that they were satisfied with their online experience, overall, and 5 students (100%) strongly

agreed or agreed that this online course met their expectations about what an online course would be like. Three students (60%) strongly agreed that this online course gave them a better learning opportunity than if they had taken the same course face-to-face, while 1 (20%) disagreed. Two students (40%) said they spent more time involved in the threaded discussions as compared to class discussion in face-to-face courses, while 3 students (60%) felt they spent the same amount of time involved in the threaded discussions as they would have in class discussions had the course been face-to-face. Two students (40%) said they spent less time interacting with the instructor as compared to interactions with instructors in other face-to-face courses, and three students (60%) felt they spent the same amount of time interacting with the instructor in the online course as they would have had the course been face-to-face. Two students (40%) said that participating in this online course required less self-discipline or time management skills when compared to participating in a face-to-face course, and three others (60%) felt their self-discipline or time management skill requirements were the same for this online course as they would have been had they taken the course face-to-face.

Students were asked if there were session topics that could potentially be added to the course or if there were sessions that could potentially be dropped from the course. There were no students responses to either of these items. When students were asked what they felt the barriers or disadvantages were of online

courses one student responded that timelines were a concern, and another responded that technical problems are barriers. When asked what the benefits or advantages of online courses the only student responses indicated being able to work at your own pace, and distance was a benefit. When students were asked why they chose to take this course online, 4 students (80%) responded that the main campus was too far, one person (20%) said that they felt more comfortable interacting in this type of environment, two (40%) said their schedule made it difficult for them to attend the face-to-face section, and two people (40%) indicated that it allowed them more flexibility.

Assessment Results

Students participating in both sections of the course were required to complete nine assessments related to specific autism topics covered in the course, as well as a cumulative final at the end of the course. Assessments were developed by the publishing company and corresponded directly to the material discussed in the text and the information contained in the powerpoint provided for the corresponding topic. Questions were presented in a true/false, multiple choice, and short answer format. All assessments were completed online through WebCT, and both the face-to-face and online students completed the assessments. All assessments were scored by WebCt. Table 4.6 contains the results of each of the nine assessments and the cumulative final, and is divided in to the face-to-face

section and the online section. The average overall score on the assessments for the face-to-face students was 86.7%. The average overall score on the assessments for the online students was 84.3%. The average score on the cumulative final for the face-to-face students was 85.4% and 79.2% for the online students. An average for each assessment topic is provided in the last row of each section of the table. The face-to-face and online student average scores were the same on the Overview of Autism Spectrum Disorders assessment and the Symbolic Communication: Common Pathways and Points of Departure assessment (94%; 91%). The face-to-face student average scores were higher than online student average scores on four of the remaining assessment topics. The last column (K) of each section contains each individual student's average on the nine assessments completed throughout the semester. The cumulative final score is not included in those averages.

Assessment Topics Data – Face-to-Face and Online

A = An Overview of Autism Spectrum Disorders

B = Brain-Behavior Connections in Autism

C = Getting a Good Start: Effective Practices in Early Intervention

D = Symbolic Communication: Common Pathways and Points of Departure

E = Structured Teaching and Environmental Supports

F= Sensory Processing: Identifying Patterns and Support Strategies

G = Teaching a Different Way of Behaving: Positive Behavior Supports

H = Social Thinking: Cognition to Enhance Communication and Learning

I = Supporting the Transition Years

J = Cumulative Final Exam

K = Student Average

FtF ID	A	B	C	D	E	F	G	H	I	J	K
1	97	80	90	100	100	83	83	100	80	82	79.6
2	85	87	100	100	83	92	92	90	90	94	91
3	100	73	100	91	83	100	100	100	100	96	94.1
4	100	93	100	91	100	75	83	90	70	96	89.1
5	97	67	100	73	83	83	83	90	70	72	82.9
6	94	73	90	91	100	83	83	90	100	84	89.3
7	85	73	90	91	83	58	67	90	90	74	80.8
Average	94	78	95.7	91	90.3	82	84.4	92.9	85.7	85.4	86.7

Online ID	A	B	C	D	E	F	G	H	I	J	K
1	97	80	100	91	100	92	83	100	80	90	91.4
2	88	73	100	100	83	75	75	70	80	72	82.7
3	91	73	100	82	100	83	75	90	70	76	82.7
4	100	80	100	100	83	83	83	90	70	90	87.7
5	94	87	90	82	100	58	83	100	80	68	77.1

Table 4.7

Table 4.8 provides the increase in each participants score from the pre-survey to the post survey for both the face-to-face and online sections of the course along with each participant's increase percentage. The table also contains the demographic data for each participant, as well as the average demographic data for each group of participants. The average increase in knowledge as measured by the *General Autism Spectrum Disorders Competencies* survey for the face-to-face students is 50.4 points, and 44.9%; for the online students it is 36 points, and

26.8%. In the face-to-face section of the course, the student who gained the least amount of knowledge based on the General Competencies Survey (+30 points; 31%) has worked with the same number students with autism (6-10) and has less years of teaching experience (8-11 years) than the person who gained the most amount of knowledge (+70 points; 73% & 12-15 years). The person who gained the most amount of knowledge in the online section of the course (+47 points: 49%) had the fewest years of teaching experience and has worked with the fewest number of students with autism (0-5), and the person who gained the least amount of knowledge was the person with the most years of teaching experience (28+) and has worked with the highest number of students with autism (20+).

Increase Between Pre and Post Survey Scores & Demographic Data

Participant	Pts ↑ Pre-Post	% ↑ Pre-Post	Age	Yrs. Exp.	Exp. # with ASD
F to F #1	+35	36.5%	30 - 35	8 – 11	6 – 10
F to F #2	+70	73%	48 - 52	12 – 15	6 – 10
F to F #3	+51	53%	53 – 58	4 -7	0 – 5
F to F #4	+59	61.5%	53 – 58	23 – 27	0 – 5
F to F #5	+51	53%	18 – 23	0 -3	0 -5
F to F #6	+30	31%	30 – 35	8 – 11	6 – 10
F to F #7	+57	59%	18 – 23	0 – 3	0 – 5
Average ↑ F to F	+50.4	44.9%	57% ≤ 35; 42% ≥ 48	42% ≤ 7 yrs. Exp.; 57% ≥ 8 yrs. Exp.	57% ≤ 5 kids w/ASD; 42% 6 – 10 kids w/ASD
Online #1	+41	42.7%	48 – 52	12 – 15	11 - 15
Online #2	+40	41.2%	48 – 52	20 -23	6 – 10
Online #3	+47	49%	24 – 29	0 -3	0 -5

Online #4	+35	36.5%	48 – 52	0 -3	0 -5
Online #5	+17	17.7%	53 – 58	28+	20+
Average ↑ Online	+36	26.8%	20% ≤ 29; 80% ≥ 48	40% ≤ 3 yrs. Exp.; 60% ≥ 12 yrs. Exp.	40% ≤ 5 kids w/ASD; 60% ≥ 6 kids w/ASD

Table 4.8

Chapter 5: Discussion

The purpose of this research study was to compare the effectiveness of a face-to-face format of instruction in autism spectrum disorders with that of a group of students participating in an online format of instruction in autism spectrum disorders. Both sections of the course were taught by the same instructor, during the same semester, at the same university in Missouri. The study was designed to analyze the knowledge of autism spectrum disorders as perceived by students participating in each of the course formats of instruction prior to the instruction, and then following their participation in the course. The purpose of this research was to investigate an online format of teacher preparation in the area of autism spectrum disorders, and a face-to-face format of instruction to understand the elements that contribute to the successfulness of either format. This chapter provides a discussion of the findings of this research project. This includes a description of the demographic variables of the participants, and the possible impact of those variables on their ability to acquire new knowledge and skills in the area of autism spectrum disorders, a summary of the results for the research questions, as well as conclusions drawn from the study. Additionally, this chapter provides a reflection on the limitations of the study and recommendations for future research.

Very little is known about special education teachers who serve students with autism. Little research has evaluated the knowledge, implementation practices, or training of these teachers as to the effectiveness of their format of instruction. Data from this study may be used to assist in identifying additional ways to improve professional development within school districts in the area of autism spectrum disorders, and assist professionals in developing preservice training programs for current and future special education teachers in the area of autism spectrum disorders. These findings are especially important given the rise in reported numbers of students with autism who are served in public schools. It has become increasingly necessary to ensure special education teachers possess requisite knowledge and skills needed to effectively serve this population.

To answer the research questions, a self-report survey was developed and completed by students enrolled in the online and face-to-face sections of the Fundamentals of Autism Spectrum Disorder course. Data obtained from self-assessments have been found to provide accurate and reliable measures of teacher knowledge and practices (Blank, 2005; Smithson & Porter, 1994). Each student completed a 16 item survey of their perceived general knowledge of autism prior to the course, and then following the course. The *General Autism Spectrum Disorders Competencies* survey contained items in a Likert-scale format ranging from 1- no awareness or knowledge to 6 – I have knowledge, competency and ability at an independent level. Students in each format also completed a survey

that was designed to obtain additional knowledge specific to their format of instruction experience. All participants each completed nine assessments relative to specific autism topic areas and a cumulative final exam. Data was analyzed in each of these areas.

A Cronbach's Alpha was used to determine the reliability of each of the surveys that were utilized in this research, and all surveys were determined to fall within an acceptable Cronbach's Alpha range of at least 0.7. A paired-samples *t* test was conducted on each of the 16 items in the pre and post survey to evaluate the mean difference of each item pair for each of the two course formats. All items except one from the online course (Item 11) were significant at $p < .05$. All items from the face-to-face course paired-samples test were significant at $p < .01$. Since the sample sizes in both groups was small a test of nonparametrics was also conducted, the Mann-Whitney *U,* for the pre-survey results of the face-to-face and online students, the post survey results of the face-to-face and online students, and the gains that were made between the face-to-face and online students. Due to the small sample size a $p < 0.15$ was used when looking for significance in the test statistics of the three tests that were conducted using the Mann-Whitney *U.* There were several items on all three test statistics that were significant at $p < 0.15$. The only item that was significant on the pre-survey, the post survey, and the gains made was Item 11.

Practitioners who participated in the face-to-face format of instruction, on average, scored themselves on the pre-survey as possessing less overall general knowledge of autism than the practitioners who were in the online section of the course, prior to instruction. While the face-to-face group made the largest overall gains in knowledge, the online group obtained a higher level of knowledge, overall. There were no knowledge items on the *General Autism Spectrum Disorders Competencies* survey in which the mean score for the participants in the face-to-face course was at a level that indicated they had obtained the knowledge, competency and ability at an independent level, even though the face-to-face students made the largest overall knowledge gains. While the online participants did not make as high overall knowledge gains as the face-to-face course participants, there were four knowledge items for which the mean score for the participants in the online course was at the level that they felt they had obtained knowledge, competency and ability at an independent level on the post survey. The median, or middle, value for the face-to-face students (2) was lower than the online students (3) on the pre-survey. Although more gains were made by the face-to-face students overall, the median value for the face-to-face students on the post survey (5) was lower than the online students (6) on the post survey. The mode, or number that is repeated more often than any other number, value for the face-to-face students (2) was lower than the online students (3) on the pre-survey. Again, although more gains were made by the face-to-face students

overall, the mode value for the face-to-face students on the post survey (5) was lower than the online students (6) on the post survey.

The final surveys for the online and face-to-face formats revealed that overall; neither group felt the course would have been more challenging had they taken the course in the other format of instruction. The face-to-face participants felt they participated more in this course than they would have had they taken the course completely online, and the majority (60%) of the online participants said they participated more in this online course than they usually do in a face-to-face course. While the face-to-face students felt the discussion threads were a valuable part of the course, they all agreed they found the in-class discussions more valuable than the online discussion threads, and said they participated more in in-class discussions than they did in the online discussion threads. The majority of the students in each format of instruction felt that their particular format of instruction gave them a better learning opportunity than if they had taken the same course in the other format of instruction. Overall, both groups of students were satisfied with the course experience. The research literature on the factors that influence students' satisfaction and success with online learning is inconclusive. Mixed results have been reported from studies investigating the effects of age, previous online experience, learning styles, and other factors on students' experiences with online coursework (Hargis, 2001: Koohang, 2004: Wyatt, 2005). Woodill (2004) and Wyatt (2005) both reported that there are

many factors that can influence learning success, and age is one of those factors. Wyatt (2005) reported finding an association between age and students' perception regarding the quality of online learning experience. He found the older the student the higher they rated the quality of the online learning experience (Wyatt, 2005). Woodill (2004) suggested there is a difference in the over-40 year old and under-40 indicating that because of the exposure and use of technology that people under-40 think differently. Hargis (2001) reported finding a difference with age and the instructional style in online coursework.

In addition to age, another factor that may affect a persons' online learning is the level of previous technology experience. Rovai (2001) indicated students with previous online course experience may interact more compared to students without previous experience. Koohang (2004) studied student perceptions of the required use of a digital library for distance learning assignments as part of a hybrid program (courses that incorporated both face-to-face and online formats). He reported that age did not influence the students reported level of positive perception of the use of the digital library system. However, there was a difference found with previous online experience. The more prior online experience students had the higher the level of positive learning experience using the digital library.

While seventy-five percent of the students who took both of these courses had previous experience with online courses, and all participants felt their level of knowledge was adequate to effectively participate in their respective course. Due to the small number of students in each group it is not possible to effectively analyze if any of these variables have an impact on educating practitioners more effectively to work with students with autism. As a group, the students in the face-to-face course performed better on the assessments than the online students. Did the younger students perform better than the older students? Did the students with more years of teaching experience perform better than those with less experience? Did those students who had more experience working directly with students with autism perform better than those who have not worked with as many students with autism? Answering those questions with this small data sample would produce a very misguided interpretation of the responses to these questions.

Limitations

This research study provides a unique examination of information relative to educating teachers to work with students with autism. It investigates an area where there is a growing need for literature to help guide administrators and professionals as they continue to address the continuing need to adequately serve this unique population of students in schools.

These courses were offered as field tests as part of a new graduate program being developed at the university. Because formal state approval for the program had not been officially received prior to the beginning of the courses both courses had predictably low enrollments. While the programs have now received final approval from all necessary entities it is important to note that graduate courses at the university are currently set at a limited enrollment of 10 students. Due to this low enrollment limit in place, a study of this type would be difficult to obtain a significant number of students to be able to gather the necessary data to adequately assess which format of instruction, face-to-face or online, is more effective in educating teachers to work with students with autism without collecting data over several semesters. Doing that would change additional aspects of the study, and may impact the overall outcomes as well. Due to the small sample size of students in each course the strength of the significance of the data tested in this research project is suspect. While there are significant test scores in several areas of this study the ability to generalize the results in any way would be inappropriate. Due to this considerable limitation, and to find a way to make appropriate use of the data gathered, it may be more useful to look more closely at the data gathered on individual students and their progress in their particular format of instruction rather than focusing on their groups as a whole, in order to be able to better apply the data gathered, and answer the research questions that are the main focus of this study.

What does the data that was gathered indicate about the students who participated in these two courses relative to the original research questions for this study? Practitioners who participated in the face-to-face format of instruction and practitioners who participated in the online format of instruction all made knowledge gains by participating in the course. While the face-to-face students made larger overall gains, the online students had more knowledge about autism prior to participating in the course. The student who had the most years of teaching experience and had worked with the most students with autism had the least amount of knowledge gained through the semester. She also had the lowest assessment score average of all students participating in the two courses. While future research in this area should include larger sample sizes it would also be beneficial to the field of knowledge in this area if the data gathered made use of more objective measures of learning rather than relying on student self-perceptions of learning. Are knowledge and skills obtained in either of the formats of instruction then able to transfer over for these teachers to effectively implement these strategies in the classroom? That is the real question that need to be answered when evaluating which format of instruction is more effective. If the field of autism is going to look to online training as a viable option for educating their teachers who work with students with autism, evidence must be provided that indicates this format of instruction will lead to beneficial outcomes for students in the classroom.

There were not enough participants in the study to identify specific components of either format of instruction that made one format more effective than the other. Both groups were satisfied with their course experience, and did not feel they would have covered more material if they had taken the course in the alternate format. While the face-to-face students made more knowledge gains than the online students, based on this small sample size, it is not possible to conclude that the face-to-face format of instruction is more successful in increasing the knowledge and skills of practitioners in the area of autism. It is also not possible to identify variables that had an impact on the level of knowledge and skills acquired by either format of instruction. Because limited information about the population was available, descriptive characteristics relevant to the variables under investigation were not known. This prevents the researcher from knowing whether the sample of participants was a true representation of the population (Mitchell & Jolley, 2007). The small sample size does not provide sufficient power to detect differences among variables.

Given the lack of specific requirements for special education teachers who serve students with autism, the beginning level of knowledge reported in the current study by participants is not surprising, and may not just be specific to the small sample of students who participated in this study. Research indicates that the numbers of students with autism being served in schools continues to rise. Research also indicates a chronic shortage of teachers adequately trained to meet

the educational needs of these students. With the expanding online capabilities continuing to grow the effectiveness of online training and education needs to continue to be explored as a possible vehicle for educating practitioners to work with students with autism spectrum disorders. This study should serve as a blueprint or template for future research in this area. Future work in this area would require randomization of the assignment of students to the particular format of instruction in order to control for the different student characteristics and motivations among students for choosing one form of instruction over the other. Are there certain types of educators who would choose an online format of instruction versus a face-to-face format? What are those characteristics? Will those characteristics impact their ability to transfer their knowledge obtained to effectively work with students with autism? Ten of the students who participated in the Fundamentals of Autism Spectrum Disorders course as part of this study are currently enrolled in the next two courses in the graduate certificate in autism spectrum disorders program. The courses are presented in an online format of instruction. There are three more courses that need to be completed as part of the certificate program of study. It is the intent of this researcher to follow up this study by developing a study that will attempt to capture whether the knowledge and skills gained by the online certificate participants can transfer over into the implementation of effective strategies, interventions and practices in the school setting when those practitioners are working with students with autism spectrum

disorders. Can practitioners who work with students with autism gain the necessary knowledge and skills via an online format of instruction to be able to effectively transfer that information into practice, and have a positive impact on students with autism in schools? If future research were able to show that online instruction can lead to effective practices and interventions for students with autism, an online format of instruction may be an effective way to educate and reach a greater number of practitioners who are currently unable to receive the necessary knowledge and skills via face-to-face training options.

Summary

The rise in reported numbers of students with autism in public schools, poor educational outcomes, increased litigation, and an expansion of knowledge of educational practices effective with this population has led to a sense of urgency among educators and parents to ensure these students are provided an appropriate education. As a result, it has become increasingly necessary to ensure special education teachers are adequately prepared and possess requisite knowledge and skills. While research supports the effectiveness of online coursework, there is little research to indicate if this format of instruction is an effective way to education those working with students with autism. This study sought to provide information to lessen the gap. Research evaluating the demographic characteristics of special education teachers who serve students with

autism is sorely needed. Much of the research available may be obsolete as prevalence rates continue to increase at alarming rates. Research is needed to provide up to date information so the issue can be fully understood and measures provided to address this growing need for knowledgeable personnel to serve this unique group. The results of this study may provide baseline data that have implications for future research and refinement of personnel preparation programs for practitioners working to educate this growing population.

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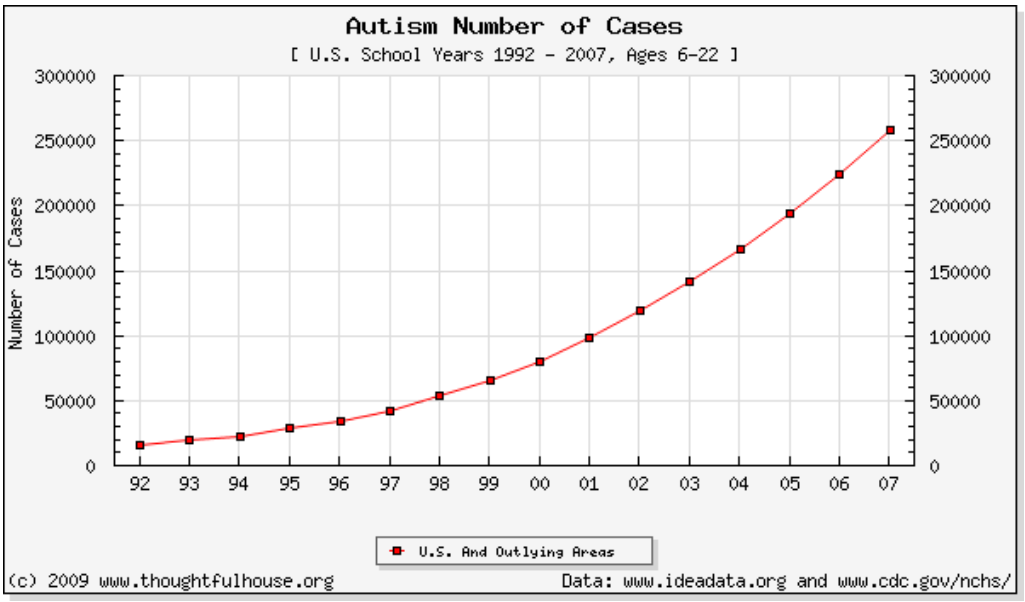
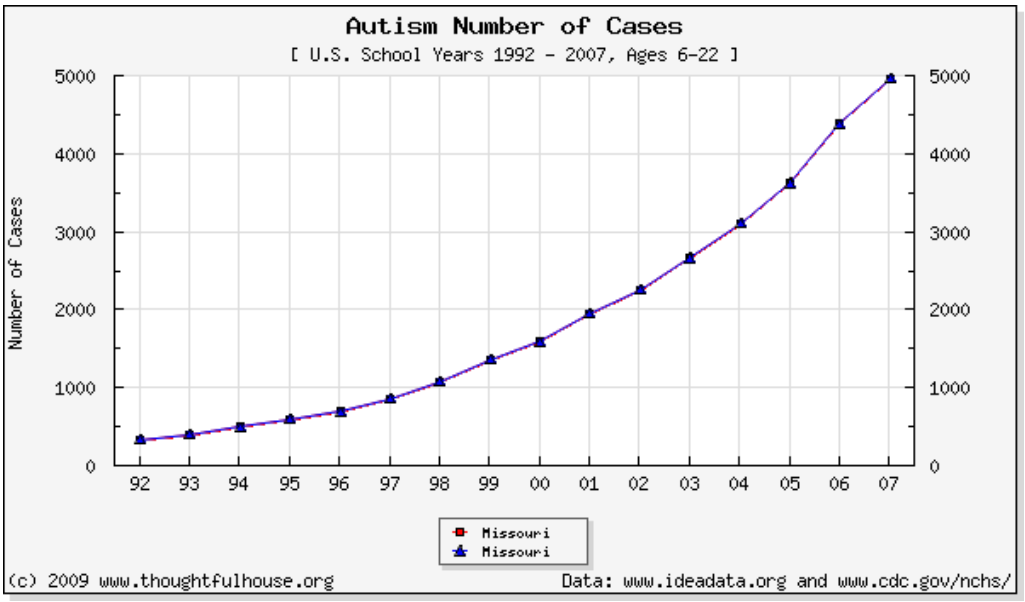
Appendix A Bar Graphs Autism Cases

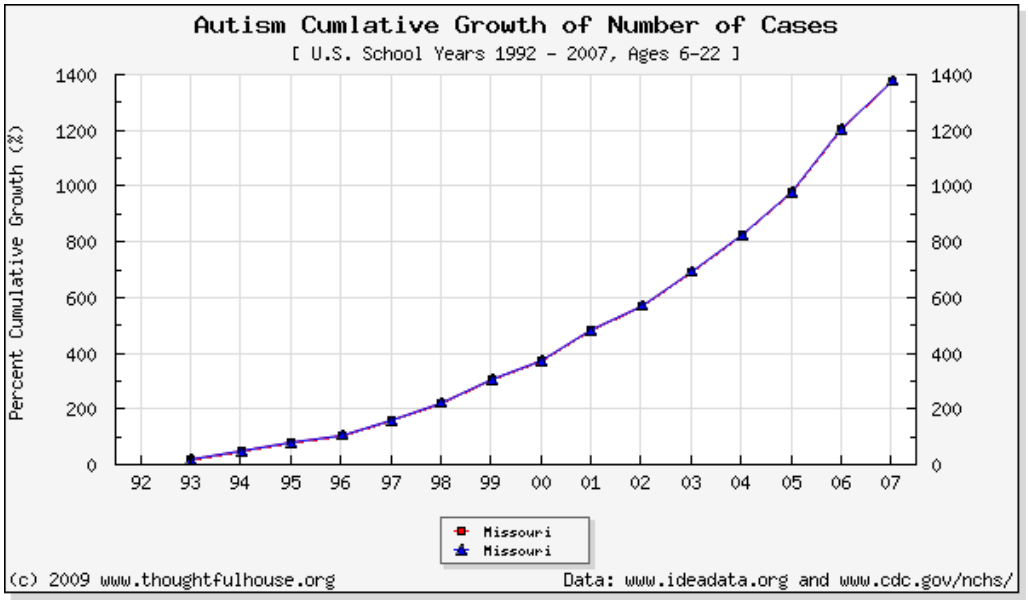
Autism, Ages 6 -22, Basic Bar Graph for U.S. and Outlying Areas



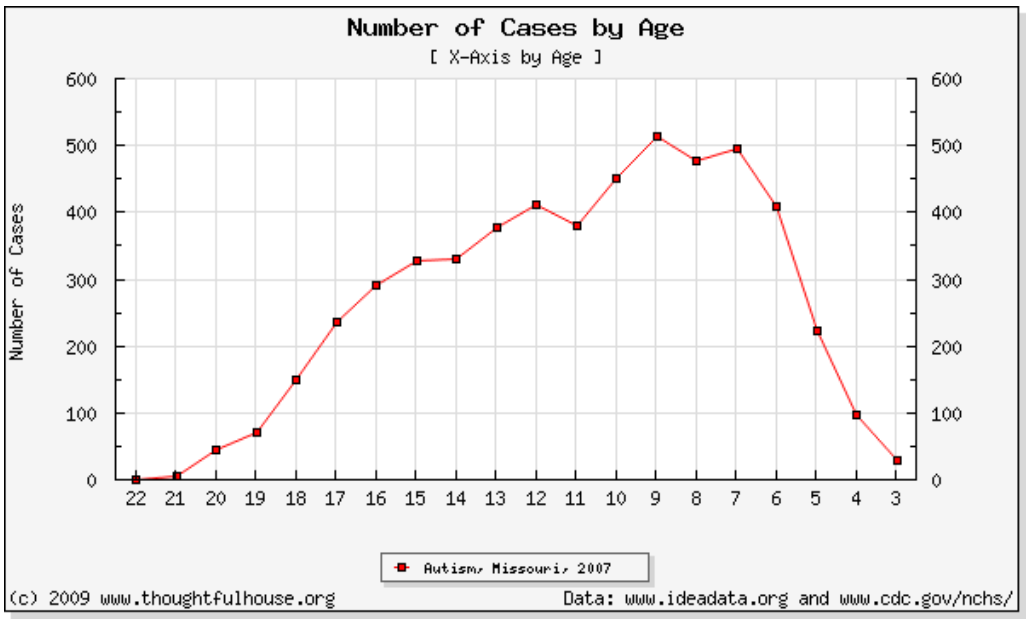
Autism, Ages 6 -22, Basic Bar Graph for Missouri



Autism, Ages 6 – 22, Bar Graph Growth of Number of Cases, Missouri



Autism, Bar Graph, Number of Cases by Age, Missouri



Appendix B General Autism Spectrum Disorders Competencies Survey Items

General Autism Spectrum Disorders Competencies Survey Items

1 – No awareness or knowledge

2 – I recognize the terms but couldn't give meaning or apply the principles

3 – I think I know this, but not using this terminology

4 – I am at an awareness level of this

5 – I have knowledge of this, but need support

6 – I have knowledge, competency and ability at an independent level

Items

1. I understand the characteristics and diagnosis of autism as defined by the most recent version of the Diagnostic and Statistical Manual of Mental Disorders.

2. I can describe the basic differences between the Pervasive Developmental Disorders: Autism, Asperger Disorder, Retts Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder- Not Otherwise Specified (PDD-NOS).

3. I can describe the current understanding of the etiology and prevalence of autism spectrum disorders.

4. I can describe the range of possible behaviors of a person with ASD.

5. I can identify the learning styles and detect the uneven profiles observed in individuals with ASD.

6. I can identify intervention/support strategies based on individual strengths and needs as they relate to learning.

7. I can describe the needs of persons with ASD based on characteristics of the disorder and ways to incorporate this knowledge into a comprehensive and adaptive program.

8. I can describe the evidence-based and promising practice interventions that have been identified as best practices.

9. I understand the impact of common medical issues for persons with autism.

10. I understand the components of communication and its impact on the day-to-day experience of an individual with autism.

11. I understand a variety of strategies to increase an individual's communication abilities.

12. I understand social skills development and the unique social skill deficits and challenges associated with ASD.

13. I am comfortable with specialized social skills strategies to teach social skills to someone with ASD.

14. I understand the factors that influence behavior and the components of behavior analysis.

15. I understand how to evaluate the effectiveness of a behavior plan as it related to someone with ASD.

16. I understand the sensory systems, sensory processing, and sensory motor development as it relates to an individual with ASD.

Appendix C Face-to-Face Student Survey Data

Face-to-Face Student Survey Data

Item	Option	Resp.	%
I have taken an online course before	Yes No	5 2	71 29
I primarily accessed the online components of this course from home.	Yes No	6 1	86 14
I primarily accessed the online components of this course from work.	Yes No	1 6	14 86
I feel my level of computer expertise was adequate to participate effectively in the online portions of the course.	Yes No	7 0	100 0
I requested technical support for this course.	Yes No	3 4	43 57
I received technical support from MWSU Instructional Technology.	Yes No	0 7	0 100
I received technical support from the instructor.	Yes No	7 0	100 0
I received technical support from someone else not related to MWSU.	Yes No	1 6	14 86
Were there some sessions that were more valuable than others?	Yes No	5 2	71 29

SA = Strongly Agree

A = Agree

N = Neither

D = Disagree

SD = Strongly Disagree

Item	Response Option	Response	%
At the beginning of the course I received all of the instructions I needed in order to be able to participate in the online portion of this course	SA A N D SD	5 2 0 0 0	71 20 0 0 0
In general, I feel the course requirements were clearly communicated.	SA A	7 0	100 0

	N D SD	0 0 0	0 0 0
I would like to take another face-to-face course with these types of online components.	SA A N D SD	6 1 0 0 0	86 14 0 0 0
I believe that if I had taken this course completely online it would have covered more material.	SA A N D SD	0 1 0 4 2	0 14 0 57 29
I believe that if I taken this course completely online I would have interacted more with the instructor.	SA A N D SD	0 0 0 4 3	0 0 0 57 43
I believe that taking this course face-to-face is more challenging than taking it online.	SA A N D SD	0 0 1 5 1	0 0 14 71 14
I participated more in this face-to-face course than I would have if I had taken in completely online.	SA A N D SD	4 2 0 1 0	57 29 0 14 0
I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I felt more anonymous.	SA A N D SD	0 0 1 5 1	0 0 14 71 14
I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I felt more freedom to express my ideas.	SA A N D SA	0 1 1 4 1	0 14 14 57 14
I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I felt more comfortable writing	SA A N	1 1 1	14 14 14

than talking.	D SD	3 1	43 14
I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I had time to think about how I wanted to express my opinion about a particular matter.	SA A N D SD	0 3 1 2 1	0 43 14 29 14
In general, I participated more during in-class discussions as compared to the online discussion threads related to this course.	SA A N D SD	3 3 1 0 0	43 43 14 0 0
A valuable part of this face-to-face course was the additional interactions with classmates through the discussion threads.	SA A N D SD	4 2 1 0 0	57 29 14 0 0
In general, I found the in-class discussions more valuable than the online discussion threads.	SA A N D SD	5 2 0 0 0	71 29 0 0 0
Overall, I was satisfied with my face-to-face course experience.	SA A N D SD	6 1 0 0 0	86 14 0 0 0
I believe that this face-to-face course gave me more opportunity to interact with my classmates than if I had taken the same course completely online.	SA A N D SD	6 1 0 0 0	86 14 0 0 0
I believe that this face-to-face course gave me a better learning opportunity than if I had taken the same course completely online.	SA A N D SD	4 2 1 0 0	57 29 14 0 0

M = More

S = Same

L = Less

Item	Options	Response	%
In this course, I spent _____ time involved in the threaded discussions as compared to class discussion in the face-to-face course.	M S L	0 0 7	0 0 100
In this course, I spent _____ time interacting with the instructor as compared to interaction with instructors in other face-to-face courses.	M S L	6 0 1	86 0 14
In this course I spent _____ time interacting with this instructor online as compared to face-to-face.	M S L	0 0 7	0 0 100
In this course I spent _____ time interacting with classmates as compared to my interactions with classmates in other face-to-face courses.	M S L	7 0 0	100 0 0
In this course I spent _____ time interacting with classmates online than I did interacting with them face-to-face.	M S L	0 0 7	0 0 100

Comments from participants:

Sessions that could potentially be added?

- She covered everything that was important for this course.
- None (2 counts)

Sessions that could potentially be dropped?

- None (2 counts)
- Brain basis is pretty complicated, technical, and probably not necessary for teaching.

In your opinion, what are the barriers or disadvantages of online courses?

- I appreciate the input from the instructor as well as the other students about their experiences.
- Questions are not answered immediately. What is covered cannot be adjusted to meet student needs.
- You sometimes feel like you are bothering the teacher, and sometimes don't get responses immediately.
- Online courses require more reading with less explanation of information. I am an auditory learner.

In your opinion, what are the benefits or advantages of online courses?

- I wouldn't have to drive so far especially in bad weather.
- Students can fit reading, videos, and tapes into their own personal schedules
- Working on your own schedule, be that in the middle of the night or on weekends.
- I loved everything about this course. I still have a lot to learn but feel that I learned a lot!!
- Learning at times that are convenient for your schedule.

Age:

18 – 23	2
30 – 35	2
48 – 52	1
53 – 58	2

Years of teaching experience:

0 – 3	2
4 – 7	1
8 – 11	2
12 – 15	1
23 – 27	1

Direct experience working with students with ASD:

0 – 5	4
6 – 10	3

Appendix D Online Student Survey Data

Online Student Survey Data

Item	Option	Resp.	%
I have taken an online course prior to this one.	Yes No	5 0	100 0
I primarily accessed the online components of this course from home.	Yes No	4 1	80 20
I primarily accessed the online components of this course from work.	Yes No	1 4	20 80
I requested technical support for this course.	Yes No	2 3	40 60
I received technical support from MWSU Instructional Technology.	Yes No	2 3	40 60
I received technical support from the instructor.	Yes No	4 1	80 20
I received technical support from someone else not related to MWSU.	Yes No	0 5	0 100
Were there some sessions that were more valuable than others?	Yes No	2 3	40 60

SA = Strongly Agree

A = Agree

N = Neither

D = Disagree

SD = Strongly Disagree

Item	Response Option	Response	%
At the beginning of the course I received all of the instructions I needed in order to be able to participate in this online course.	SA A N D SD	4 1 0 0 0	80 20 0 0 0
My level of computer skills was adequate to effectively participate in this course.	SA A N D	4 1 0 0	80 20 0 0

	SD	0	0
I would like to take another online course.	SA A N D SD	5 0 0 0 0	100 0 0 0 0
I believe that if I had taken this course face-to-face I would have interacted more with the instructor.	SA A N D SD	1 2 1 1 0	20 40 20 20 0
I believe that if I had taken this course face-to-face it would have covered more material.	SA A N D SD	1 1 0 2 1	20 20 0 40 20
I believe that taking this course online was more challenging than taking it face-to-face.	SA A N D SD	0 0 1 2 2	0 0 20 40 40
I participated more in this online course than I usually do in a face-to-face course.	SA A N D SD	1 2 1 1 0	20 40 20 20 0
I participated more in this online course than I usually do in a face-to-face course because I felt anonymous.	SA A N D SD	0 1 2 1 1	0 20 40 20 20
I participated more in this online course than I usually do in a face-to-face course because I felt more freedom to express my ideas.	SA A N D SA	1 2 1 1 0	20 40 20 20 0
I participated more in this online course than I usually do in a face-to-face course because I had time to think about how I wanted to express my opinion about a particular matter.	SA A N D SD	1 3 0 1 0	20 60 0 20 0

I participated more in this online course than I usually do in a face-to-face course because I felt more comfortable writing than talking.	SA A N D SD	2 1 1 0 1	40 20 20 0 20
In general, I feel the course requirements were clearly communicated.	SA A N D SD	3 2 0 0 0	60 40 0 0 0
A valuable part of this online course was the interactions with classmates through the discussion threads.	SA A N D SD	1 3 1 0 0	20 60 20 0 0
Overall, I was satisfied with my online course experience.	SA A N D SD	4 1 0 0 0	80 20 0 0 0
This online course met my expectations about what an online course would be like.	SA A N D SD	3 2 0 0 0	60 40 0 0 0
I believe that this online course gave me a better learning opportunity than if I had taken the same course face-to-face.	SA A N D SD	3 0 1 1 0	60 0 20 20 0
I believe that this online course gave me more opportunity to interact with my classmates than if I had taken the same course face-to-face.	SA A N D SD	1 0 2 2 0	20 0 40 40 0

M = More

S = Same

L = Less

Item	Options	Response	%
In this course, I spent _____ time involved in the threaded discussions as compared to class discussion in face-to-face courses.	M S L	2 3 0	40 60 0
In this online course, I spent _____ time interacting with the instructor as compared to interaction with instructors in other face-to-face courses.	M S L	0 3 2	0 60 40
Participating in this online course required _____self-discipline or time management skills when compared to participating in a face-to-face course.	M S L	0 3 2	0 60 40

Comments from participants:

Sessions that could potentially be added?

- No responses

Sessions that could potentially be dropped?

- No responses

In your opinion, what are the barriers or disadvantages of online courses?

- Timelines
- Technical problems

In your opinion, what are the benefits or advantages of online courses?

- Distance
- Own pace

Why did you choose to take this as an online course? (Check all that apply.)

- The main campus it too far 4

- I feel more comfortable interacting in this type of format 1
- My schedule makes it difficult to attend the face-to-face section 2
- I feel the instructor is more accessible in this type of format 0
- It allows me more flexibility 2

Age:

24 - 29 1

48 – 52 4

Years of teaching experience:

0 – 3 2

12 - 15 1

20 - 23 1

28 + 1

Direct experience working with students with ASD:

0 – 5 2

6 – 10 1

11 – 15 1

20+ 1

Appendix E Email Request for Consent

Email Request for Consent

Dear ******:

I am writing to secure your informed consent to participate in the research aspect of the Fundamentals of Autism Spectrum Disorders course that was offered through Missouri Western State University in the fall of 2009.

We must have your informed consent to participate, and are able to get this from you via email. Please read the information below and then reply back to this email. In your reply, please indicate your having received the study information and that you agree to participate. You can copy and paste the statement below into your reply. Your email address serves as your signature.

"I have received the information statement and agree to participate in this study."

This email consent gives me permission to use the information gained from the course either through the face-to-face section of the course or the online section of the course for research purposes only.

I understand:

- The purpose of the information gathered on students' experiences, feelings, and opinions regarding this online/face-to-face course.
- The information will be used for the continued development and improvement of this course offering, and will help to identify the relative strengths and weaknesses of the course as presently designed.
- There are minimal foreseeable discomforts or risks to subjects who participate in the follow up surveys relative to the course.
- Information you provide will be confidential and we will in no way connect your name to the information provided in the surveys.

I would be happy to answer any questions concerning the project before, during, and after data collection. Please feel free to contact me, Lisa Robbins, anytime by email at lrobbins@missouriwestern.edu or by phone at 816-271-5629.

Thank you very much for your cooperation and willingness to participate, and I look forward to your participation in this project. Again, please do not hesitate to contact me if you have any questions or concerns.

Sincerely,

Lisa Robbins

Appendix F Items Contained in the Face-to-Face Student Survey

Student Survey of Face-to-Face Course

1. I have read the informed consent form and agreed to participate. Agree Disagree

2. I had taken an online course prior to this one. Yes No

3. I primarily accessed the online components of this course from home. Yes No

4. I primarily accessed the online components of this course from work. Yes No

5. I feel my level of computer expertise was adequate to participate effectively in this course. Yes No

6. I requested technical support for this course. Yes No

7. I received technical support from MWSU Instructional Technology. Yes No

8. I received technical support from the instructor. Yes No

9. I received technical support from someone else not related to MWSU. Yes No

10. At the beginning of the course I received all of the instructions I needed in order to be able to participate in the online portion of this course. Strongly Agree Agree Neither Disagree Strongly Disagree

11. In general, I feel the course requirements were clearly communicated. SA A N DA SDA

12. I would like to take another face-to-face course with these types of online components. Strongly Agree Agree Neither Disagree Strongly Disagree

13. I believe that if I had taken this course completely online it would have covered more material. SA A N DA SDA

14. I believe that if I had taken this course completely online I would have interacted more with the instructor. SA A N DA SDA

15. I believe that taking this course face-to-face is more challenging than taking it online. SA A N DA SDA

16. I participated more in this face-to-face course than I would have if I had taken it completely online. SA A N DA SDA

17. I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I felt more anonymous. SA A N DA SDA

18. I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I felt more freedom to express my ideas. SA A N DA SDA

19. I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I had time to think about how I wanted to express my opinion about a particular matter. SA A N DA SDA

20. I participated more in the discussion thread portion of this course than I usually do in a face-to-face course because I felt more comfortable writing than talking. SA A N DA SDA

21. In general, I participated more during in-class discussions as compared to the online discussion threads related to this course. SA A N DA SDA

22. A valuable part of this face-to-face course was the interactions with classmates through the discussion board. SA A N DA SDA

23. In general, I found the in-class discussions more valuable than the online discussion threads. SA A N DA SDA

24. Overall, I was satisfied with my face-to-face course experience. SA A N DA SDA

25. I believe that this face-to-face course gave me more opportunity to interact with my classmates than if I had taken the same course completely online. SA A N DA SDA

26. I believe that this face-to-face course gave me a better learning opportunity than if I had taken the same course completely online. SA A N DA SDA

27. In this course I spent ___ time involved in threaded discussions as compared to class discussion in the face-to-face course. More Same Less

28. In this course I spent ___ time interacting with the instructor as compared to interaction with instructors in other face-to-face courses. More Same Less

29. In this course I spent ___ time interacting with this instructor online as compared to face-to-face.

30. In this course I spent ___ time interacting with classmates as compared to my interactions with classmates in other face-to-face courses. More Same Less

31. In this course I spent ___ time interacting with classmates online than I did interacting with them face-to-face. More Same Less

32. Were there some sessions that were more valuable than others? Yes No

33. Sessions that could potentially be added?

34. Sessions that could potentially be dropped?

35. In your opinion, what are the barriers or disadvantages of online courses?

36. In your opinion, what are benefits or advantages of online courses?

37. Why did you choose to take this as an online course? (check all that apply)
- The main campus is too far
- I feel more comfortable interacting in this type of format
- My schedule makes it difficult to attend face-to-face
- I feel the instructor is more accessible in this type of format
- Other

AGE 18-23; 24-29; 30-35; 36-41; 42-47; 48-52; 53-58; 59-64; 65 and above

Years of teaching experience: 0-3; 4-7; 8-11; 12-15; 16-19; 20-23; 24-27; 28 years or more

Experience working with students with ASD: 0-5 students; 6-10 students; 11-15 students; 16-20 students; more than 20 students

Adapted from Picciano, 2002

Appendix G Items Contained in the Online Student Survey

Student Survey of Online Course

1 I have read the informed consent form and agreed to participate. Agree Disagree

2 I had taken an online course prior to this one. Yes No

3 I primarily accessed this online course from home. Yes No

4 I primarily accessed this online course from work. Yes No

5 I requested technical support for this course. Yes No

6 I received technical support from MWSU Instructional Technology. Yes No

7 I received technical support from the instructor. Yes No

8 I received technical support from someone else not related to MWSU. Yes No

9 At the beginning of my course I received all of the instructions I needed in order to be able to effectively participate in this online course. Strongly Agree Agree Neither Disagree Strongly Disagree

10 My level of computer skills was adequate to effectively participate in this course. Strongly Agree Agree Neither Disagree Strongly Disagree

11 I would like to take another online course. Strongly Agree Agree Neither Disagree Strongly Disagree

12 I believe that if I had taken this course face-to-face it would have covered more material. SA A N DA SDA

13 I believe that if I had taken this course face-to-face I would have interacted more with the instructor. SA A N DA SDA

14 I believe that taking this course online was more challenging than taking it face-to-face. SA A N DA SDA

15 I participated more in this online course than I usually do in a face-to-face course. SA A N DA SDA

16 I participated more in this online course than I usually do in a face-to-face course because I felt anonymous. SA A N DA SDA

17 I participated more in this online course than I usually do in a face-to-face course because I felt more freedom to express my ideas. SA A N DA SDA

18 I participated more in this online course than I usually do in a face-to-face course because I had time to think about how I wanted to express my opinion about a particular matter. SA A N DA SDA

19 I participated more in this online course than I usually do in a face-to-face course because I felt more comfortable writing than talking. SA A N DA SDA

20 In general, I feel the course requirements were clearly communicated. SA A N DA SDA

21 A valuable part of this online course was the interactions with classmates through the discussion board. SA A N DA SDA

22 Overall, I was satisfied with my online course experience. SA A N DA SDA

23 This online course met my expectations about what an online course would be like. SA A N DA SDA

24 I believe that this online course gave me more opportunity to interact with my classmates than if I had taken the same course face-to-face. SA A N DA SDA

25 I believe that this online course gave me a better learning opportunity than if I had taken the same course face-to-face. SA A N DA SDA

26 In this online course I spent ___ time involved in threaded discussions as compared to class discussion in face-to-face courses. More Same Less

27 In this online course I spent ___ time reading for class as compared to reading for a face-to-face course. More Same Less

28 In this online course I spent ___ time interacting with the instructor as compared to interaction with instructors in a face-to-face course. More Same Less

29 Participating in this online course required _____ self-discipline or time management skills when compared to participating in a face-to-face course. More Same Less

30 Were there some sessions that were more valuable than others? Yes No

31 Sessions that could potentially be added?

32 Sessions that could potentially be dropped?

33 In your opinion, what are the barriers or disadvantages of online courses?

34 In your opinion, what are benefits or advantages of online courses?

35 Why did you choose to take this as an online course? (check all that apply)

- The main campus is too far
- I feel more comfortable interacting in this type of format
- My schedule makes it difficult to attend face-to-face
- I feel the instructor is more accessible in this type of format
- Other

AGE:
18-23; 24-29; 30-35; 36-41; 42-47; 48-52; 53-58; 59-64; 65 and above

Years of teaching experience: 0-3; 4-7; 8-11; 12-15; 16-19; 20-23; 24-27; 28 years or more

Experience working with students with ASD: 0-5 students; 6-10 students; 11-15 students; 16-20 students; more than 20 students

Adapted from Picciano, 2002